US Army Corps of Engineers®
Vicksburg District

Flood Control, Pearl River Basin, Mississippi

PEARL RIVER WATERSHED, MISSISSIPPI

Feasibility Study

MAIN REPORT

Draft & Environmental Impact Statement

Volume I

PRELIMINARY

Not for Public Release

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PEARL RIVER WATERSHED
FEASIBILITY REPORT

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PEARL RIVER WATERSHED
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PEARL RIVER WATERSHED
FEASIBILITY REPORT

STUDY AUTHORITY

1. Studies of the Pearl River Watershed, Mississippi, were authorized by congressional resolutions adopted 9 May 1979. These authorizations read as follows:

"Resolved by the Committee on Public Works and Transportation of the House of Representatives, United States, That the Board of Engineers for Rivers and Harbors is hereby requested to review the reports of the Chief of Engineers on Pearl River Basin, Mississippi and Louisiana, published as House Document Number 282, Ninety-Second Congress, Second Session, and other pertinent reports, with a particular view toward determining whether any further improvements for flood damage prevention and related purposes are advisable at this time. The alternatives are to be reviewed with local interests to insure a viable, locally supported project.

Resolved by the Committee on Public Works and Transportation of the House of Representatives, United States, That the Board of Engineers for Rivers and Harbors is hereby requested to review the report of the Chief of Engineers on the Pearl River and Tributaries, Mississippi, contained in House Document 441, 86th Congress, and other reports with a view to determining whether measures for prevention of flood damages and related purposes are advisable at this time, in Rankin County, Mississippi.

Resolved by the Committee on Environment and Public Works of the United States Senate, That the Board of Engineers for Rivers and Harbors, created under Section 3 of the River and Harbor Act, approved June 13, 1902, and is hereby requested to review the reports of the Chief of Engineers on Pearl River Basin, Mississippi and Louisiana submitted in House Document Numbered 92-282, 92d Congress, 2nd Session and other pertinent reports with a view to determining whether any further improvements for flood damage prevention and related purposes are warranted at this time."

2. Authorization for construction of Shoccoe Dam is contained in Section 401(e) of the Water Resources Development Act (WRDA) of 1986 (Public Law 99-662) which reads as follows:

"(3) PEARL RIVER BASIN, INCLUDING SHOCCOE, MISSISSIPPI.--The Secretary is authorized to construct a project for the purpose of providing flood control for the Pearl River Basin in Mississippi, including, but not limited to, Carthage, Jackson, Monticello, and Columbia, Mississippi, consisting of--

(A) the project for flood control, Pearl River Basin, Mississippi: Report of the Chief of Engineers, dated March 17, 1986, at a total cost of $80,100,000, with an estimated first Federal cost of $56,070,000 and an estimated first non-Federal cost of $24,030,000; and

(B) for the purpose of providing flood control for the upstream areas of the Pearl River Basin in Mississippi--

(i) a combination roadway crossing of the Pearl River and floodwater detention and storage facility in east central Leake County, Mississippi;

(ii) a levee system in the south part of Carthage, Mississippi, which will upgrade, extend, and improve the protective levee system on the south side of Highway 16 in Leake County and the city of Carthage;

(iii) appropriate drainage structure and bridge modifications to expand and improve the stormwater conduits under Mississippi Highway 35, south of Carthage, Mississippi, for the purposes of reducing backwater influence for areas upstream of such highway;

(iv) upstream reservoirs on the Pearl River;

(v) such other structures as may be necessary to alleviate unforeseen flooding in the Leake County area as a result of the construction of the Shoccoe Dry Dam; and

(vi) channel improvements on the upstream Pearl River. For purposes of analyzing the costs and benefits of those portions of the project described in subparagraph (B), the Secretary shall take into account the costs and benefits of that portion of the project described in subparagraph (A)."

STUDY PURPOSE AND SCOPE

3. This report discusses the findings of feasibility studies for the Pearl River Watershed, Mississippi. These studies were conducted in partnership with the Rankin-Hinds Pearl River Flood and Drainage Control District (RHPRFDCD)--the non-Federal sponsor.

4. Previous studies conducted as a part of the comprehensive Pearl River Basin Study found Shoccoe Dam to be the best plan to address flooding problems in the Pearl River Watershed. Shoccoe Dam was authorized for construction by WRDA 86, but was subsequently determined to be unimplementable from a local interest standpoint. The Pearl River Basin Development District (PRBDD) and Hinds County Board of Supervisors requested the U.S. Army Corps of Engineers, Vicksburg District, undertake an investigation of alternative flood control measures. Reconnaissance studies for the Pearl River Watershed were completed in June 1990. These studies focused on evaluation of a comprehensive levee system consisting of approximately 24 miles of new levees and raising approximately 11 miles of the existing levees. Reconnaissance studies indicated that feasibility studies were warranted and a Feasibility Cost-Sharing Agreement (FCSA) was executed with PRBDD on 25 September 1991.

5. The resulting recommended plan documented in a January 1996 draft report was a comprehensive levee system to provide protection from the 1979 flood. The sponsor attempted on two occasions to obtain bonding authority from the state legislature. Both attempts were defeated largely in part to questions over the operation of the Ross Barnett Reservoir and downstream concerns over flooding and bank caving. The study action was suspended in July 1998 because the sponsor was unable to secure a source of funds for their share. The final feasibility report was never completed.

6. In 1996, local interests proposed the LeFleur Lakes (LL) plan, consisting of upper and lower lakes along the Pearl River south of the Ross Barnett Reservoir, as an alternative to the comprehensive levee plan. The lakes would extend from the Ross Barnett Reservoir outlet downstream along the Pearl River to approximately 1 mile southwest of Interstate 20. In order to create the lakes and adjoining flood-free land for commercial development, the plan proposed performing cut and fill operations on the Pearl River. The combined lakes would cover approximately 4,700 acres (4,100 acres of the upper lake and 600 acres of the lower lake) at normal operating levels. Weirs at both the upper and lower lakes would regulate flow.

7. At the request of local interests, an independent evaluation of the LL plan was conducted during June-December 2000 by an Architect-Engineer firm, URS, jointly selected and cost shared equally by the Vicksburg District and PRBDD. The evaluation indicated that the LL plan

could reduce Pearl River flooding in the Jackson area as would the levee plan, at an estimated project cost in excess of $300,000,000.

8. Meetings were held with PRBDD and RHPRFDCD on 5 September 2001 to discuss resumption of studies in Jackson, Mississippi, directed toward developing a compromise plan incorporating aspects of both the levee and lakes plans. Such a plan could potentially provide a high degree of flood protection, be economically feasible and environmentally sustainable, and be supported locally. The RHPRFDCD, in agreement with the PRBDD, indicated they would be the non-Federal sponsor for the resumed study. Based on meeting results, the Vicksburg District requested and received funds to prepare the Project Management Plan (PMP) and FCSA for negotiation with a non-Federal sponsor. Studies would have included all reasonable alternatives. The draft PMP prepared for developing a compromise plan was presented to RHPRFDCD in May 2002.

9. Subsequent to preparing the draft PMP, the non-Federal sponsor requested limiting feasibility studies to include only updating the levee plan recommended in the above-referenced January 1996 draft report, and analyzing only the LL plan. The LL plan could be designated the Locally Preferred Plan (LPP). The sponsor did not want to participate in a study which examined a reasonable array of alternatives. The PMP was revised to reflect a study limited to these two plans. During subsequent coordination activities with the non-Federal sponsor, it was determined that levees downstream of the proposed LL plan lower weir would be needed in

conjunction with the lakes. These areas included south Jackson and Richland. During the conduct of the study, it was determined that levees would also be needed in the Town and Lynch Creek areas. Therefore, studies included investigations of levees for south Jackson, Richland, and Town and Lynch Creeks as components of the LL plan. The FCSA, necessary to resume investigations of "Pearl River Watershed, Mississippi" suspended in July 1998, was signed with RHPRFDCD on 15 October 2003. The RHPRFDCD provided the majority of their 50 percent share of study costs by conducting work-in-kind.

10. The levee plan recommended in the previous study was the only levee plan included in these investigations. The LL plan was evaluated to the same detail as the levee plan. Project features were evaluated to ensure that the latest economic and environmental regulations for acceptability under Federal laws and regulations are met.

11. In February 2006, Congressman Chip Pickering requested a meeting to discuss the LL plan. This meeting, attended by Congressman Pickering, Mr. Leland Speed (Director of Mississippi Economic Development Authority), RHPRFDCD representatives, and Vicksburg District staff, was held in Jackson on 24 February 2006. Congressman Pickering recognized that the LL project would probably not be justified economically, precluding Federal participation in implementation. In that light, he described the likelihood that local interests could pursue LL project implementation independently. Subsequent discussion established that the most logical point in the study process for this decision to be made would be when the preliminary draft

feasibility report was prepared. Although only preliminary costs had been developed at the time, it was already apparent that economic justification, in accordance with Federal guidelines, of the LL plan was unlikely. Therefore, study efforts thereafter concentrated on completing draft documentation for the non-Federal sponsor's use in the National Environmental Policy Act (NEPA) and Section 404 permitting process.

REPORT FORMAT

12. The overall document is comprised of a main report, a DEIS, and supporting documentation. The main report consists of problem identification, plan formulation, description of the levee and LL plans and summary of findings. The DEIS discusses anticipated effects of the proposed plans. The supporting documentation includes technical appendixes. The report has been prepared in general accordance with Engineering Regulation 1105-2-100, "Guidance for Conducting Civil Works Planning Studies."

STUDY AREA DESCRIPTION

GENERAL

13. The Pearl River Basin, as shown on Plate 1, is located in the southern central portion of Mississippi and in a small part of southeastern Louisiana. The primary study area comprises the Pearl River Basin between River Mile (RM) 270.0 just south of Byram, Mississippi, and RM 301.77 at the dam of Ross Barnett Reservoir. Municipalities within the study area include Jackson, Flowood, Pearl, and Richland. The study area includes parts of three

counties--Madison, Hinds, and Rankin. Major tributaries of the Pearl River within the study area include Richland, Caney, Lynch, Town, and Hanging Moss Creeks. This area is shown on Plate 2.

PRIOR STUDIES, REPORTS, AND EXISTING WATER PROJECTS

CORPS STUDIES AND REPORTS

Survey Report Recommending Existing Levee Project

14. A survey study of the Pearl River and Tributaries, Mississippi, was authorized by the Chief of Engineers on 2 May 1949. The survey report was submitted to the South Atlantic Division Engineer by the Mobile District Engineer on 30 June 1959 and recommended a system of levees for Jackson and east Jackson in combination with channel cutoffs and improvements between the levees. Authority for construction of these works is contained in Section 203 of the Flood Control Act of 14 July 1960, Public Law 86-645. Construction was completed in 1968.

Comprehensive Survey of the Pearl
River Basin, Mississippi and Louisiana

15. A comprehensive study of the water and related land resources of the Pearl River Basin was completed in 1970 by the Corps in cooperation with the Departments of the Interior; Agriculture; Health, Education, and Welfare; Transportation; Commerce; the Federal Power Commission; and the States of Mississippi and Louisiana. The resulting comprehensive plan included structural measures in two categories--an early action program and a framework for future planning. In addition, nonstructural measures were recommended in the area of flood plain management, agricultural land and forest management, health, water quality, recreation, fish and wildlife enhancement, preservation of natural areas, data collection, and review of water resource programs and policies. Structural measures in the early action program included three multiple-purpose reservoirs (Ofahoma, Carthage, and Edinburg), land treatment measures, and a pleasure boatway over 302 miles of the Pearl River.

Edinburg Dam Phase I
Design Memorandum (DM)

16. A followup report on the Ofahoma, Carthage, and Edinburg Dam projects was completed by the Mobile District in January 1972 and published as House Document 92-282, 2d Session. It was concluded in that report that only the Edinburg project was economically justified.

17. Phase I DM planning studies on the Edinburg project were authorized in WRDA 74. A special report which provided a brief economic analysis of the project was furnished to Congress in September 1980 in response to a provision in Report Number 96-1086 of the House of Representatives on the Supplemental Appropriations and Recision Bill of 1980. The reevaluation of the Edinburg project in that report indicated that the project was no longer economically justified due to increases in project costs resulting from errors in the preliminary topographic mapping used in the 1970's and changes in water resources policy which resulted in reductions in project benefits. Nevertheless, the Edinburg project, as well as the Ofahoma and Carthage projects, were reevaluated in the Pearl River Basin Interim Report on Flood Control discussed in paragraph 12.

Town Creek, Jackson, Mississippi

18. A survey report on the feasibility of flood protection measures on Town Creek at Jackson was completed in August 1970. The conclusion in that report was that no economically feasible flood control plan for Town Creek could be identified. This report was returned for reevaluation and the authorities requesting that investigation were combined with other authorities responded to in the Pearl River Basin Interim Report on Flood Control discussed in paragraph 12.

Pearl River Basin Interim
Report on Flood Control

19. Following the Easter flood of 1979, numerous House and Senate resolutions were passed directing review by the Corps of various water resource problems in the Pearl River Basin. A comprehensive basin study was initiated to address these resolutions in addition to others which had been previously funded.

20. A reconnaissance report was completed by the Mobile District and approved in November 1981. This report recommended more detailed evaluation of various flooding problems in the Basin to be documented in an interim report on flood control.

21. The 1981 reconnaissance report identified four flood control project elements which appeared economically feasible. These elements were referred to as the "Four Point Plan" and consisted of constructing a wave barrier in the Ross Barnett Reservoir, clearing the floodway below the levees in Jackson, constructing a river bend cutoff through the old sanitary landfill in south Jackson, and removing sediment deposit at the Highway 25 crossing on the Pearl River.

22. The Four Point Plan was authorized for construction in the FY 83 Supplemental Appropriations Bill. Detailed studies indicated that the river bend cutoff was not incrementally justified and was therefore deleted from the plan. The work at Ross Barnett Reservoir was

deleted because of a lack of Federal interest. The Highway 25 work was completed by PRBDD and was reimbursed for the Federal share of these costs. Detailed studies showed the clearing plan should be reduced in scope. DM No. 1, "Flood Control for Jackson, Mississippi," May 1984, contained documentation for the Four Point Plan.

23. "The Pearl River Basin Interim Report on Flood Control," July 1985, recommended construction of a dry dam in the vicinity of Shoccoe, Mississippi. The WRDA 86 authorized construction of Shoccoe Dam. Due to opposition from upstream interests, Shoccoe Dam is not implementable.

Slidell, Louisiana, and
Pearlington, Mississippi

24. An interim report on flood control for Slidell, Louisiana, and Pearlington, Mississippi, was prepared by the Vicksburg District in March 1985. Flood control improvements in Slidell were authorized by Congress in the Supplemental Appropriations Act of 1985 (Public Law 99-88) and in WRDA 86 (Public Law 99-662). The plan of improvement consists of a 4.5-mile levee system providing 200-year protection to subdivisions north of Interstate 10 and a 10.5-mile levee system providing 200-year river and hurricane protection to many of the subdivisions south of Interstate 10. The cost of the recommended plan of improvement is approximately $39.8 million

and will protect some 3,029 existing structures in the project area. A General Design Memorandum (GDM) was prepared in 1992, but was not approved due to inability of the local sponsor to provide local requirements.

Carthage/Leake County, Mississippi,
Interim Flood Control Report

25. Studies to determine the feasibility of flood control measures for Carthage were completed in February 1987. Carthage experiences some flooding from backwater from the Pearl River and from Town Creek, a tributary of the Pearl River which flows through Carthage. Alternatives evaluated included channel improvements and levees. WRDA 86 authorized construction of Shoccoe Dam and additional flood control measures in Leake County and Carthage. The findings from this study were incorporated into the GDM for Shoccoe Dam. None of the alternatives evaluated for Carthage, Leake County, were economically feasible.

Columbia and Picayune, Mississippi,
and Bogalusa, Louisiana, Interim
Flood Control Report

26. Studies to determine the feasibility of flood control measures for the urban areas of Columbia, Picayune, and Bogalusa were completed in February 1989. These cities experience flooding both from backwater from the Pearl River and from tributaries of the Pearl River. Alternatives evaluated included channel improvements, small dry dams, and levees. Results of these studies indicated that none of the plans evaluated were economically justified.

Caney Creek, Mississippi

27. Reconnaissance studies were conducted to investigate urban flood damage reduction and bank stabilization along Caney Creek in southwest Jackson. The reconnaissance study was completed in November 1990. No economically justifiable plan was identified, and further studies were not recommended.

Jackson Metropolitan Area, Mississippi

28. The Vicksburg District prepared a draft 1996 feasibility report for the Jackson Metropolitan Area. This report recommended a comprehensive levee plan to protect the Jackson Metropolitan Area from a flood of the 1979 magnitude. However, the plan was not implementable due to lack of local support and studies were suspended in July 1998. The results of this investigation were incorporated into the current resumed flood control investigation for Jackson entitled, "Pearl River Watershed, Mississippi."

CONTINUING AUTHORITIES, SECTION 205

29. Three flood reconnaissance investigations were conducted under the authority of Section 205 of the Flood Control Act of 1948, as amended. In 1979, the Mobile District

investigated flooding along Richland Creek in Rankin County. This investigation showed that protection of existing development from headwater floods was not economically justified.

30. Flood problems in Mendenhall, Mississippi, were evaluated by the Mobile District in an October 1984 Section 205 Detailed Project Report on Sellers Creek. Measures evaluated included flood plain evacuation, clearing and snagging, upstream impoundments, and channel modifications. None of the plans were economically justified.

31. The Vicksburg District investigated flooding problems in Pearl and Flowood. A plan consisting of approximately 2 miles of channel enlargement on a tributary of Neely Creek was recommended in the Detailed Project Report submitted in May 1988. The project was later discontinued due to the inability to execute a Local Cooperation Agreement (LCA) with the project sponsor.

OTHER CORPS FLOOD-RELATED INVESTIGATIONS

32. Other Corps flood-related reports are as follows:

Dam Safety Report, 1981

Caney Creek Flood Insurance Administration (FIA) Report, 1969

Hanging Moss and White Oak Creeks FIA Report, 1975

Hobolochitto Creek and East and West Hobolochitto Creeks

FIA Report, 1975

Lynch Creek FIA Report, 1971

Pearl River and Neely Creek FIA Report, 1973

Purple Creek FIA Report, 1968

Strong River and Sellers and Terrapin Creeks FIA Report, 1974

Yochanookany River, Dye Ditch, and Munson Creek FIA Report, 1972

STUDIES BY OTHERS

Department of Agriculture Studies

33. The Natural Resources Conservation Service (NRCS), under authority of Public Law 83-566, participated with the Mobile District's study of the Pearl River Basin during the 1983 timeframe. One component of this study involved the identification of potential reservoir sites above Jackson for floodwater storage.

34. The NRCS has completed several investigations in the Pearl River Basin. They include evaluations of flood problems on Sellers Creek in Mendenhall, Town Creek in Carthage, Magees Creek in Tylertown, and certain tributaries in Columbia, Mississippi.

Studies by Local Interests

35. There have been numerous flood control studies on the Pearl River conducted by local interests. The PRBDD retained local engineering firms to develop seven major studies as follows:

a. Michael Baker Engineering Company's 1981 reports on extension of the existing levee system in the Jackson area; Hinds-Rankin levee south and channel improvement; levee system alternatives for Columbia, Monticello, and Morgantown; Jackson highways, railroads, and other encroachments; flood relief in the Jackson, Mississippi, area obtainable by selective clearing; and U.S. Highway 98 at Columbia.

b. Harza Engineering Company's 1982 report on upgrading the Ross Barnett project for flood control.

c. Another Harza Engineering Company's study in 1983 report on the cost effectiveness of Shoccoe Dam, including soil borings.

d. Law Engineering Company's 1981 report on the hydrology and hydraulics of alternative upstream sites.

e. Jim Noblin's 1983 report which contained real estate appraisals for land in the Shoccoe pool and flood damage studies.

f. Engineering Associates, Inc., 1985 report on an evaluation of the 1983 floods and recommendations for improvements in Columbia, Monticello, and Tylertown.

g. Waggoner Engineering, Inc., has conducted numerous topographic surveys and other studies.

36. The Pearl River Valley Water Supply District, the state agency which owns and operates the Ross Barnett project, retained Harza Engineering Company and Simon, Li, and Associates to redesign the fuse plug emergency spillway at the project and develop computer models for the operation of Ross Barnett Reservoir. The city of Jackson has also conducted numerous studies on the Pearl River. The most pertinent study is the evaluation of the Jackson parkway/ levee plan on the west bank of the river from County Line Road to Lakeland Drive. Other municipalities in the Jackson area have retained engineers from time to time to evaluate the impacts of various flood control proposals on their communities.

EXISTING WATER PROJECTS

Jackson Levees

37. The Jackson (Fairgrounds) and East Jackson levees were completed in 1968 by the Corps. The locations of the levees are shown on Plate 1. These protective works consist of two earthen levees, four gated outlets, and two pumping stations. Some 5.34 miles of river channel work was involved in constructing the plan. The Fairgrounds levee protects 420 acres in the fairgrounds area of Jackson on the west side of the river. The longer, East Jackson levee protects 5,870 acres, including the town of Pearl and portions of Flowood and Richland. This project was sponsored by the Rankin-Hinds Pearl River Flood and Drainage Control District, which presently operates and maintains the levees. Maintenance, in addition to maintaining the levee structures, involves periodic removal of vegetation along a 650-foot-wide cleared strip between the levees. In 1984, an extension on the north end of the Fairgrounds levee was constructed to eliminate flanking of the levee, such as occurred during the record flood of April 1979. This extension is approximately 0.2 mile long and protects an additional 380 acres.

38. The Fairgrounds levee top grade was set based on protecting against a 100-year-flood flow of 103,000 cubic feet per second (cfs) with 3 feet of freeboard. Subsequent hydrology studies raised the computed 100-year peak floodflow at Jackson to 111,000 cfs. In view of the increase

of the flow for the 100-year flood event, a study was made to determine the adequacy of the levee protection under present conditions. It was found that the new work accomplished in the floodway since 1968 has lowered the elevation of the 100-year flood stage. The levees now provide protection from the revised 100-year flood (111,000 cfs) with about 2.5 feet of freeboard.

39. The original pumping facilities included three 15-cfs pumps at the Fairgrounds levee and three 150-cfs pumps in the East Jackson levee. In 1993, the Rankin-Hinds Pearl River Flood and Drainage Control District added an additional 45 cfs at the Fairgrounds station and an additional 150 cfs at the East Jackson station.

Floodway Clearing

40. The clearing plan which was completed in 1984 extended from about 0.5 mile below the old Jackson sanitary landfill to Woodrow Wilson Bridge, a total of 3.3 river miles. The plan consisted of 237 acres of complete clearing, 20 acres of selective clearing, and 89 acres of partial clearing. Approximately 39,000 tons of riprap were required for protection around bridges. The clearing plan is shown on Plate 2. To offset unavoidable impacts to fish and wildlife associated with the clearing plan, approximately 320 acres of bottom-land hardwood were acquired as mitigation. The PRBDD is the local sponsor for this project.

Excavation at
Highway 25 Bridge

41. The modification at Highway 25 bridge consisted of removing material from the west bank of the Pearl River approximately 600 feet upstream and downstream of the bridge to increase the conveyance of the stream at that location. This work was completed by PRBDD in 1983. The location of this work is shown on Plate 2.

Richland Creek Watershed

42. A flood control project for the Richland Creek Watershed was completed in 1991 by NRCS under Public Law 83-566. The project included land treatment measures, 3 floodwater-retarding structures, and 17.6 miles of channel work. The plan provides a reduction in headwater flooding along Richland Creek and tributaries and along two relatively small streams in the common flood plain with the Pearl River. The benefits accrue to rural properties, crops, and pasture and urban properties within the city of Richland. Local sponsors are the Richland Creek Watershed Drainage District and Rankin County Soil and Water Conservation District.

Ross Barnett Reservoir

43. The Ross Barnett Reservoir was constructed by the Pearl River Valley Water Supply District, a state-chartered organization, between 1960 and 1962 for the purposes of water supply and recreation. The dam and reservoir location are shown on Plate 2. The earthfill dam is 23,400 feet in length with a maximum height of 64 feet. Elevation at the top of the dam is 308 feet, National Geodetic Vertical Datum (NGVD). The principal spillway consists of ten 40- by 21-foot tainter gates with a discharge capacity of 180,000 cfs. The emergency spillway is a fuse plug type with a discharge capacity of 70,000 cfs.

PLAN FORMULATION

EXISTING CONDITIONS

Physical Setting

44. Basin Characteristics. The Pearl River Basin, as shown on Plate 1, is located in the south-central portion of Mississippi and in a small part of southeastern Louisiana. The river drains an area of 8,760 square miles consisting of all or parts of 23 counties in Mississippi and parts of 3 Louisiana parishes. The Basin has a maximum length of 240 miles and a maximum width of 50 miles. It is bounded on the north by the Tombigbee River Basin, on the east by the

Pascagoula River Basin, on the south by Lake Borgne and the Mississippi Sound, and on the west by the Mississippi River Basin and several coastal streams which drain the eastern portion of Louisiana. There are numerous lakes within the Basin, but only a few of significant size. The largest of these is Ross Barnett Reservoir, which is located on the Pearl River about 12 miles northeast of downtown Jackson.

45. Topography and Physiography. The Pearl River Basin lies within the East Gulf Coastal Plain which is physiographically subdivided into the North Central Hills (or Plateau), Jackson Prairie, Southern Pine Hills, and Coastal Pine Meadows districts. These districts cross the Basin generally in a northwesterly direction. Elevations in the Basin range from sea level in the Coastal Pine Meadows Subdivision to approximately 650 feet, NGVD, in the North Central Hills.

46. Geology and Soils.

a. Geologically, the Pearl River Watershed is not a contained unit because the formations extend beyond the topographic divides into adjoining stream basins. The formations at the surface are sedimentary in origin and range in age from early Eocene to Recent.

b. Sand and clay in various proportions constitute nearly all the immense prism of sedimentary deposits extending from the northern part of the Basin to the coast; a few thin units of marl, limestone, and glauconitic and lignitic material also are present in several places. Individual sand beds are irregular in thickness and few can be traced more than about 5 miles.

However, predominantly sandy zones, as differentiated from predominantly clayey zones, are correlatable over wide areas, some throughout much of the Basin. The formations dip southwestward at 20 to 80 feet per mile throughout the northern three-fourths of the Basin, except where they are interrupted by such structural features as the Jackson Dome and many smaller salt domes. The rate of dip becomes steeper in the southern part of the Basin where pronounced downwarping toward the Mississippi River structural trough has resulted in a dip of 100 feet per mile or more.

47. Stream Characteristics. The Pearl River is formed in Neshoba County, Mississippi, by the confluence of Nanawaya and Tallahaga Creeks and flows southwesterly for 130 miles to the vicinity of Jackson (including the 43-mile-long Ross Barnett Reservoir), then southeasterly for 233 miles to the head of its outlet channels, the Pearl and West Pearl Rivers. The Pearl River has an average fall of approximately 1.0 foot per mile. The river banks, exclusive of the Ross Barnett Reservoir, vary from about 12 to 40 feet high between Edinburg and Jackson and from 20 to 90 feet high between Jackson and the head of the Pearl and West Pearl Rivers. The width of the channel varies from about 100 to 300 feet between Jackson and Edinburg, except for the reach of the Ross Barnett Reservoir, and from about 400 to 1,000 feet below Jackson.

48. Ground Water. Practically all of the ground water is derived from precipitation and reaches the water table through infiltration and percolation. In general, ground water is relatively free from pollution and nearly constant in quality and temperature. The abundant ground-water resources which underlie the Pearl River Basin are generally of good to excellent quality.

Aquifers in the Claiborne Group furnish practically all existing ground-water supplies in the northern third of the Basin. Although the underlying Wilcox Group occupies about 1,000 feet of the freshwater section in that area, it is virtually untapped for water supplies due to its greater depth and the availability of adequate water at shallow depths. Beds of Miocene age constitute sources of ground-water supplies throughout the southern two-thirds of the Basin and are the only significant sources in about one-half of the Basin.

49. Climate.

a. Rainfall in the Basin in general is abundant and well distributed throughout the year. Light snowfall in the Basin is not unusual. However, it accounts for only a small part of the annual precipitation. There is some seasonal variation in rainfall, with the heaviest rains usually occurring in the winter and spring and the lightest during the fall. The average annual precipitation over the Basin is about 57 inches, of which 28 percent occurs in the winter, 28 percent in the spring, 26 percent in the summer, and 18 percent in the fall. Normally, the period of greatest monthly precipitation occurs in March or July and the least in October.

b. Prolonged droughts seldom occur in the Basin. The year 1952, with an average basinwide rainfall of a little over 35 inches, was the driest of record. The record wet year was 1979 when the Basin rainfall averaged nearly 84 inches.

c. Storms occurring in the Pearl River Basin include local thunderstorms, or cloudbursts, and general disturbances of the hurricane and frontal types. Summer storms are generally thunderstorms with high intensities over small areas. Flood-producing storms in the winter and spring are usually frontal storms, covering large areas and lasting from 2 to 4 days. Past records indicate that winter storms are likely to be more intense in the northern part of the Basin and summer storms more intense in the southern part.

Hydrologic Setting

50. Prior to 1979, the flood of record was the 1902 flood which had a recorded peak discharge of 85,000 cfs at the Jackson gage. Prior to 1979, the second greatest flood occurred in 1961 with a peak discharge of 66,000 cfs. These record flood levels were far surpassed when the most damaging flood in Jackson's history occurred in April 1979. In a 2-day period between 12-13 April 1979, rainfall amounts measuring up to 19.6 inches fell over the headwaters of the Basin. The resulting flood had a measured peak at the Jackson gage of 128,000 cfs. The resulting peak stage at the Jackson gage was 43.3 feet, NGVD. In May 1983, another severe rainfall in the upper basin generated a peak flow of 78,600 cfs, resulting in a peak stage of 39.5 feet, NGVD, at the Jackson gage. As published by the U.S. Geological Survey (USGS), the frequencies of the 1979 and 1983 flood events at the Jackson gage were 200- and 35-year flood events, respectively.

Environmental Resources

51. Vegetation in the study area is diverse and consists of typical forested wetland/upland tree species associations. Predominant habitat types include bottom-land hardwoods, cypress-tupelo gum brakes, black willow disturbed areas, pines, mixed pine-hardwoods, pasture/old field, cutover, and open water areas.

52. The Pearl River Basin supports high wildlife populations. Despite the presence of man and his various activities between Ross Barnett Reservoir Dam and Byram, the flood plain continues to be a relatively productive area for wildlife. Wildlife species in the study area include white-tailed deer, mourning dove, gray squirrel, cottontail rabbits, swamp rabbits, bobwhite, raccoon, wood duck, migratory waterfowl, and a host of nongame species. Furbearers are also present in the area, and wild turkey may occasionally utilize the area.

Water Quality

53. The city of Jackson depends upon surface water from the Pearl River for its public water supply. Therefore, the segment of the Pearl River between the Ross Barnett Reservoir Dam and the raw water intake structure (RM 290.6) is classified by the Mississippi Bureau of Pollution Control as public water supply. Between the intake structure and Byram, the Pearl River is classified for fish and wildlife.

Fishery Resources

54. The fishery resources of the Pearl River and Ross Barnett Reservoir, as well as those of Mayes Lake (located north of the Illinois Central Gulf Railroad (ICGR) bridge at RM 290.58, and Crystal Lake (located north of U.S. Highway 80) are heavily utilized by sport fishermen. The Mayes Lake area is part of LeFleur Bluff State Park and is owned, maintained, and operated by the Mississippi Department of Wildlife, Fisheries and Parks (MDWFP). The high quality and proximity of these lakes to a major metropolitan area make fishery resources especially valuable.

Air Quality

55. Air quality for the entire State of Mississippi is considered good. The Jackson area is in total compliance with concentration limits of the National Ambient Air Quality Standards.

Noise

56. Noise problems are limited to those associated with normal day-to-day activities such as air and automobile traffic, construction, and industry. The generation of noise within the proposed study area will be primarily limited to the contribution from automobile traffic over several

highway bridges crossing the Pearl River. There are no sources of excessive noise that can cause problems within the proposed study area.

Recreational Opportunities

57. Recreational opportunities within the proposed study area include both consumptive activities such as hunting and fishing and nonconsumptive activities such as hiking, nature study, and outdoor photography. On the west bank of the river, south of Lakeland Drive, is LeFleur Bluff State Park. This area has been developed primarily for nonconsumptive recreation activities and includes a swimming pool, golf course, tennis courts, picnic areas, playgrounds, and hiking trails. The Mayes Lake area, part of the state park complex, consists of several ponds and oxbow lakes used extensively for fishing and includes easy access and wooden piers for bank fishermen.

Esthetics

58. Much of the proposed study area near Jackson is a forested area void of residential, commercial, or industrial development. The remaining land is visually pleasing, providing diversity to the landscape of the Jackson area. This greenbelt provides a visually relaxing atmosphere for those persons wishing to escape the asphalt and concrete of the nearby Pearl River Watershed.

Cultural Resources

59. Cultural resource surveys were completed on the Pear River Watershed study area. Details of these investigations are presented in Appendix 8.

Endangered Species

60. The Corps requested a list of endangered or threatened species that may occur within the study area in a letter dated 2 June 2004. Three endangered species were identified—the bald eagle, ringed sawback turtle, and gulf sturgeon. Records indicate that the endangered bald eagle is known to occur in the area of the Ross Barnett Reservoir and that the threatened ringed sawback turtle, a species known only from the Pearl River system, has been collected in the study area. The Pearl River has been designated as critical habitat for the gulf sturgeon from the Gulf of Mexico to the Ross Barnett Reservoir.

Development and Economy

61. Socioeconomic Characteristics. The following discussion presents information on the demographic and economic characteristics of Hinds and Rankin Counties, Mississippi. Madison County was not included since less than 1 percent of the county is within the study area.

62. Population. Data from the 1990 Census show a population of 342,000 in the two-county area, an increase of 6.7 percent since 1980. Significantly, this two-county area contained 13.3 percent of the state's 1990 population. Especially strong growth occurred in Rankin County, with a 58 percent increase from 1970 to 1980 and 26.3 percent from 1980 to 1990.

63. Income. With the economic growth in the area, major changes have occurred in the income of the two counties. The 1990 per capita income (PCI) figures for each county showed increases in excess of 70 percent over the 1980 numbers. Rankin County's gain was 80.5 percent (from $8,180 to $14,765), with Hinds County increasing 72 percent from $9,151 to $15,753.

FUTURE WITHOUT-PROJECT CONDITIONS

Environmental Setting

64. The land use of the study area is expected to change little during the anticipated project life. Flood plain zoning restrictions and local experience with flooding will minimize further encroachment into the flood plain. Urbanization is projected to claim approximately 5 percent of undeveloped areas during the project life. Land use practices on woodland areas will continue with landowners allowing forest succession to occur for future timber production. Wildlife population on these lands is projected to remain high. Federal and state water quality requirements are expected to have a stabilizing effect on water quality in the study area.

Hydrologic Setting

65. Without additional flood protection along the Pearl River, periodic flooding will continue to plague residential areas, commercial businesses, industries, and local infrastructure. Little change is expected in the streambed due to sediment deposition or erosion. No change is foreseen in the operation of the Ross Barnett Reservoir which is assumed to function as a run-of-river structure for this study.

PROBLEMS AND OPPORTUNITIES

Flooding

66. The study area is primarily affected by headwater flooding caused by the Pearl River. Headwater flooding is caused by unusually heavy and intense rainfall over the upper Pearl River Basin.

67. Prior to 1979, the flood of record was the 1902 flood which had a recorded peak discharge of 85,000 cfs at the Jackson gage. The modern day flood of record had occurred in 1961 with a peak discharge of 66,000 cfs. These record flood levels were far surpassed by the events of 1979 and 1983. The worst flood in Jackson's history occurred in 1979. In a 2-day period between 12-13 April 1979, rainfall in amounts measuring up to 19.6 inches fell over the headwaters of the Basin. The resulting flood had a measured peak at the Jackson gage of 128,000 cfs measured at the gage in Jackson. Flood damages in Jackson were devastating. In May 1983, another severe rainfall in the upper Basin generated a peak flow at 78,600 cfs at the Jackson gage. The frequencies of the 1979 and 1983 flood events are estimated to be, respectively, 200- and 35-year flood events at the Jackson gage. Because of the severity of these two floods, other floods which occurred between 1979 and 1983 are rarely mentioned. For the record, floods with frequencies

of 5 to 10 years occurred on 21 March 1980, 14-17 April 1981, 6 December 1982, and 8-9 April 1983. This repeated flooding over the 4-year period caused a great deal of trauma to the citizens of Jackson and explains their intense interest in flood control.

68. During the 1979 flood, 1,935 houses and 775 businesses were flooded. Damages to these properties were especially severe because the river was above flood stage from 10 to 14 days in some areas. This caused serious disruptions to transportation and communications and stymied the capital city for weeks. In fact, many of the flood victims interviewed indicated that it took 6 months to 1 year for a return to normal conditions.

69. The total physical property damage caused by the 1979 flood was estimated at $233 million in 1979 dollars. Although this flood was devastating, it should be emphasized that it could have been much worse if it were not for some well executed emergency flood-fighting activities. First, the Ross Barnett project, a water supply and recreation lake with no dedicated flood control storage, was used beyond its normal limits to regulate floodflows and reduce the peak flow in Jackson by 17,000 cfs. Had the storm pattern been different or the flood forecasts not been exceptionally accurate, this would not have been possible. Secondly, the Federal flood control levees in Jackson were designed for a 100-year flood flow of 103,000 cfs (the peak flow in 1979 was 128,000 cfs). The Fairground levee on the west side of the river was flanked on the north end, thereby flooding the area behind the levee. However, the East Jackson levee held because of a monumental sandbagging effort when the floodwaters were lapping at the top of the levee.

Had the East Jackson levee been overtopped, there would have been an additional 1,065 homes and 293 businesses flooded. Flood damages in that event would have been about $535 million in 1984 dollars, an increase of about $235 million.

Fish and Wildlife

70. Due to the increased urban environment, suitable habitat for fish and wildlife is being reduced. As urban growth continues in the study area, fish and wildlife habitat areas may be further reduced unless preservation measures are undertaken by local interests. The need exists to protect and enhance fish and wildlife habitat.

Recreation

71. There is a need to provide the local citizens of the study area opportunities to participate in nonconsumptive uses of the area's natural resources such as hiking, picnicking, nature photography, birdwatching, canoeing, nature trails, etc. Such recreational areas could be developed in conjunction with the recommended plan for providing flood protection to the area.

PLANNING OBJECTIVES

72. In accordance with the Water Resources Council's Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (P&G), the Federal objective of water and related land resources planning is to contribute to National Economic Development (NED) consistent with protecting the nation's environment pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements.

73. As a result of the problem identification process, the objectives listed below formed the basis for the formulation of alternative plans. These objectives are in consonance with the intent of the P&G and other planning guidance.

a. Reduce flood damages to existing development with the Jackson Metropolitan study area.

b. Minimize adverse environmental impacts through project design.

c. Compensate 100 percent for unavoidable environmental impacts.

PLANNING CONSTRAINTS

General

74. The formulation of alternatives for this study was influenced by the previous draft feasibility study completed in 1996 which recommended a comprehensive levee plan to protect the Jackson Metropolitan Area. Rather than evaluating a full array of alternatives, information from the draft feasibility study was used and updated. Only the levee plan recommended in the previous study was included in this investigation. The locally preferred LL plan, consisting of channel enhancement through dredging and realignment, an island for economic development, and the construction of two weirs that would create two lakes, was included as an additional alternative.

75. As indicated above, during negotiations of the draft PMP with the non-Federal sponsor, which included investigations of all reasonable alternatives, Headquarters, U.S. Army Corps of Engineers (HQUSACE), guidance was received directing the draft PMP be revised to limit feasibility studies to updating the previously proposed levee plan and an analysis of the LL plan. The PMP was subsequently revised to reflect this guidance and the study was conducted accordingly.

Formulation and Evaluation Criteria

76. The comprehensive levee plan and the LL plan were evaluated in accordance with various technical, economic, environmental, and socioeconomic criteria. When applied, these criteria provide the means for responding to the problems and opportunities of the area by selecting a plan in the best public interest, consistent with other developments in the area, and developing an economically feasible solution.

77. Federal policy on multiobjective planning derived from both legislative and executive authorities establishes and defines the national objectives for water resource planning, specifies the range of impacts that must be assessed, and sets forth the conditions and criteria which must be applied when evaluating plans. Plans must be formulated considering benefits and costs, both tangible and intangible, and effects on the environment and social well-being of the community.

78. Plan formulation criteria include published regulations and principles adopted by the Water Resources Council and the Corps regulations. Other criteria used are in compliance with the P&G, NEPA, and Executive Orders 11988 and 11990.

Technical Criteria

79. The Ross Barnett Reservoir will operate as a run-of-river dam and no reduction of peak discharges would be reduced by the reservoir. This criterion is consistent with previous Corps flood control evaluations in the Pearl River Watershed.

80. The economic life of the project was assumed to be 50 years.

81. Unavoidable environmental losses will be mitigated to the extent practicable.

Economic Criteria

82. Benefits and cost should be expressed in comparable terms as fully as possible. Evaluations for the previously recommended comprehensive levee plan and the LL plan are based on November 2006 price levels and the current Federal interest rate of 4-7/8 percent.

83. Each alternative considered in detail must be justified so total beneficial effects (monetary and nonmonetary) associated with the objectives are equal to or exceed the total adverse effects (monetary and nonmonetary) associated with the objectives.

84. Economic impacts of alternatives are based upon the risk analysis procedures described in Engineer Circular 1105-2-205, 25 February 1994.

Environmental Criteria

85. Plans should be formulated to the extent practicable to preserve or improve the quality of the natural environment.

86. Fish and wildlife mitigation features are to be undertaken concurrently with project features.

Socioeconomic Criteria

87. Consideration should be given to evaluating and preserving historical, archeological, and other cultural resources.

88. Consideration should be given to safety, health, community cohesion, and social well-being.

89. Displacement of people by the floods and/or the project should be minimized to the extent practicable.

PRELIMINARY SCREENING

90. The Pearl River Basin Interim Report on Flood Control, July 1985, completed by the Mobile District, recommended Shoccoe Dam to protect the Jackson Metropolitan Area. The draft Jackson Metropolitan Area, Mississippi, completed by the Vicksburg District in January 1996, recommended a comprehensive levee plan. Both studies considered a broad range of flood damage reduction measures in the screening process.

91. The affected public provided assistance in identifying other issues to be evaluated. A NEPA scoping meeting with approximately 400 in attendance was held in Jackson on 23 February 2004 to outline the study procedures and receive public input concerning the study process and problems in the area. An information meeting was held on 11 March 2004 in Biloxi, Mississippi, with approximately 50 in attendance. The transcripts of these meetings are included in Appendix 1.

92. Alternatives considered in this feasibility study to provide flood protection to the Pearl River Watershed include no-action, the comprehensive levee plan, and the LL plan. These alternatives are discussed in the following paragraphs.

NO-ACTION ALTERNATIVE

93. A no-action alternative was considered, but it would not eliminate any of the damages the metropolitan area has historically experienced. This would result in continued flood damage, trauma, and serious disruptions to human endeavors in the capital area and associated impacts to the entire State of Mississippi.

COMPREHENSIVE LEVEE PLAN

GENERAL

94. The comprehensive levee plan consists of constructing approximately 21.9 miles of new levee, 3,720 feet of floodwall, enlarging 10.5 miles of the existing Jackson and East Jackson levees, building 9 box culverts and 9 concrete pipe water control structures, and constructing landside connecting ditches. The comprehensive levee plan is shown on Plate 3. Limited overbank clearing would be required to reduce stages at Lakeland Drive and minimize adverse impacts to the tailwater on the Ross Barnett spillway. This overbank clearing consists of a 100-foot strip on each side of the channel top bank from RM 290.5 to 301.5 and a 400-foot strip across six bendways. Plates 4-V-1 through 4-V-17 in Volume II show the proposed alignment of the levee and the location of major drainage structures and landside connecting ditches.

95. The levees would be fully compacted, have 1 vertical on 3 horizontal side slopes, a 10-foot-wide crown, and a 5-foot-thick impervious riverside face. Because of the 1 vertical on 3 horizontal landside slope, no roadway addition was considered. Any roadway crown addition would have added substantial construction and real estate requirements. For new levee closures required at highways, railroads, etc., an earthen and sandbag closure would be required. The Fairgrounds and East Jackson levee enlargements would be constructed on the landside of the existing levee to minimize the necessity of impervious clay materials. Additional borrow borings would be taken during the preparation of plans and specifications to confirm this.

Levee Segments

96. Each levee segment is described in the following paragraphs:

a. Northeast Jackson levee (Station 0+00 to 301+54). The Northeast Jackson levee (shown on Plates 4-V-1, 4-V-2, and 4-V-3) begins in the Jackson Country Club area near County Line Road and extends southward along the west bank of the Pearl River to Lakeland Drive (Highway 25). This proposed levee segment is approximately 5 miles long and has an average height of 22 feet. From Highway 25, a floodwall would extend south and westward to high

ground just east of Eubanks Creek. This floodwall is required because of the highly developed area south of Lakeland Drive and the close proximity to LeFleur Bluff State Park (Mayes Lakes area).

b. Eubanks Creek (Station 0+00 to 16+96). This segment, shown on Plate 4-V-3, begins at high ground just south of Lakeland Drive and extends southerly to Eubanks Creek, then continues in a westward direction to high ground. The levee would be 0.3 mile long and have an average height of 24.5 feet.

c. Belhaven Creek (Station 0+00 to 17+06). The Belhaven Creek Reach, shown on Plate 4-V-4, is an extension of the existing Fairgrounds levee necessitated by an increase in the level of protection for that area. The levee begins at high ground along the shoulder of the northbound lane of Interstate 55. The average height of the levee is 25 feet and is approximately 0.3 mile long.

d. Fairgrounds levee (Station 0+00 to 92+41). The entire Jackson levee, shown on Plate 4-V-4, will be enlarged to raise it 3 to 5 feet to provide the same level of protection as the new levees. In addition, the extension along the Fortification Street ramp will be raised to the proposed levee design grade and be connected to the Belhaven Creek levee. This segment would be approximately 1,600 feet long.

e. Town and Lynch Creeks levee (Station 0+00 to 71+95). This reach of levee, shown on Plate 4-V-5, begins on high ground near the Old Brandon Road crossing on the Pearl River (Woodrow Wilson Bridge) and proceeds southerly along the west bank of the river. The levee crosses Highway 80 and Interstate 20 before tying into high ground just south of Lynch Creek. The levee is approximately 1.4 miles long and has an average height of 17 feet.

f. South Jackson levee (Station 0+00 to 198+63). The South Jackson levee, shown on Plates 4-V-6 and 4-V-7, begins at high ground approximately 1 mile above the Jackson Sewage Treatment Plant and extends south along the west bank of the river until it reaches the disposal pond levees. A riverside enlargement of the perimeter levee around the plant would be required. The levee would then extend south from that point and ultimately tie back into high ground just north of Elton Road interchange on Interstate 55 south. Approximately 3.8 miles of levee would be required for this portion of the comprehensive levee system and the average height of the levee would be 10 feet.

g. Flowood levee (Station 0+00 to 279+24). This levee, shown on Plates 4-V-8 and 4-V-9, originates on high ground at a point approximately 0.25 mile west of Fannin Road and 1.25 miles north of Highway 25 (Lakeland Drive) and extends southwesterly around a newly developed residential area. From this point, the levee would continue approximately parallel to

Lakeland Drive before turning southwesterly to follow along the east bank of the Pearl River. After crossing Lakeland Drive, the levee would continue to follow the east bank of the river until intersecting the existing East Jackson levee just west of Highway 468. This segment of levee would be approximately 5.3 miles long and have an average height of 13 feet.

h. East Jackson levee (Station 140+00 to 626+25). Approximately 8.7 miles of the existing East Jackson levee, shown on Plates 4-V-10 to 4-V-14, would be raised approximately 2 to 6 feet to provide design flood protection. Also, a 0.5-mile extension would be required at the downstream end tying into the ICGR embankment just north of Childre Road. The upper limits of the levee enlargement would end near Highway 468.

i. Richland levee (Station 0+00 to 264+34). The Richland levee, shown on Plates 4-V-15 to 4-V-17, would be "U-shaped" around the city of Richland. It would begin at high ground east of Highway 49 and extend northwesterly across Highway 49 to a point near the ICGR embankment. From this point, the levee turns westerly until it crosses the ICGR embankment. Then the levee would extend southerly to high ground 0.25 mile southeast of the intersection of Old Highway 49 and the ICGR. Approximately 5 miles of levee would be required for this portion of the levee system with an average height of 13 feet.

Gravity Floodgates

97. Structures recommended to be built through the project levee are listed below.

a. Northeast Jackson.

Station 25+30 - Two 60-inch-diameter concrete pipes

Station 110+93 - Two 12- by 12-foot box culverts

Station 147+18 - One 12- by 12-foot box culvert

Station 235+51 - Two 48-inch-diameter concrete pipes

b. Floodwall extension.

Station 291+11 - One 36-inch-diameter concrete pipe

c. Eubanks Creek.

Station 10+94 - Two 8- by 7-foot box culvert

d. Fairgrounds extension.

Station 9+64 - One 12- by 10-foot box culvert

e. Town and Lynch Creeks.

Station 16+65 - Three 12- by 12-foot box culverts

Station 65+90 - Three 12- by 12-foot box culverts

f. South Jackson.

Station 37+79 - Two 48-inch-diameter concrete pipes

Station 165+34 - Two 9- by 9-foot box culverts

g. Flowood.

Station 41+57 - Two 48-inch-diameter concrete pipes

Station 92+27 - One 48-inch-diameter concrete pipe

Station 175+05 - Two 6- by 5-foot box culverts

Station 197+24 - Two 36-inch-diameter concrete pipes

Station 257+94 - Two 8- by 6-foot box culverts

h. Richland.

Station 31+50 - One 36-inch-diameter concrete pipe

Station 152+74 - Two 48-inch-diameter concrete pipes

Property Relocations

98. Due to the increase in stages between the proposed levees in the vicinity of Lakeland Drive, existing development on each side of Lakeland Drive on the west bank of the Pearl River would be adversely affected. Stages could increase by as much as 1 foot in this area with the larger floods. Early investigations revealed that a levee or floodwall could not be constructed around this development without acquiring many of the 28 buildings at this location. As a result, the recommended plan includes total acquisition of this area. Two other commercial buildings adjacent to the Richland levee will likely require acquisition due to their proximity to Richland Creek.

Mitigation Measures

99. Following the detail design of the comprehensive levee plan, compensation requirements were recomputed. The recommended compensation measure of acquisition and reforestation of frequently flooded cleared lands was evaluated. Based on the analysis in Appendix 2, approximately 1,680 acres would be required to offset adverse terrestrial impacts of the comprehensive levee plan. Due to the fact that mitigation would be accomplished during construction of the project and all lands would be acquired from willing sellers, the specific location of the mitigation land cannot be determined until immediately prior to the time of acquisition. Table 1 depicts the criteria used in the selection of the lands at the time of acquisition. Development measures proposed for the mitigation lands include planting of appropriate open areas in bottom-land hardwood species, establishing necessary access roads, surveying and establishing boundaries, and establishing a management headquarters.

TABLE 1
MITIGATION SITE SELECTION CRITERIA

DRAINAGE BASIN LOCATION CRITERIA
1. Lower Pearl River Basin (south of Jackson and west of Interstate 59)
2. Upper Pearl River Basin (north of Jackson)
3. Bogue Chitto River Basin
4. Bayou Pierre River Basin
5. Mississippi Delta-Yazoo River Basin, Sunflower River Basin, etc.
6. Lower Big Black River Basin (west of Interstate 55)
7. Leaf River Basin
EXISTING LAND USE TYPE CRITERIA
1. Degraded wetlands in riverine flood plains; e.g., abandoned surface mines, actively farmed lands, pasture lands
2. Degraded upland forests in riverine flood plains
3. Cutover forested wetlands
4. Mature bottom-land forests
LAND REHABILITATION METHODS CRITERIA
1. Wetland restoration including replacement of hydrology and woody vegetation
2. Wetland reforestation where hydrology is in place
3. Reforestation of uplands associated with riverine habitats
4. Preservation of a unique habitat or a habitat important to a Federally listed threatened or endangered species
SPECIFIC LAND LOCATION CRITERIA
1. Sites adjacent to state management areas, national wildlife refuges, U.S. Forest Service lands, etc., that are managed for fish and wildlife
2. Sites adjacent to existing forested areas
3. Sites adjacent to farmed areas that would provide corridors between wooded areas
4. Sites adjacent to developed residential areas
5. Sites adjacent to developed commercial areas

SUMMARY OF COMPREHENSIVE LEVEE PLAN

100. Table 2 shows a breakdown of the costs for the comprehensive levee plan. An economic summary is shown in Table 3.

TABLE 2
SUMMARY OF FIRST COST a/
COMPREHENSIVE LEVEE PLAN

Account	Item	Amount ($)
01	Lands and Damages b/	67,282,446
02	Relocations	17,266,188
06	Fish and Wildlife Facilities	695,797
11	Levees and Floodwalls	64,256,458
15	Floodway Control and Diversion Structures	25,122,665
30	Planning, Engineering, and Design	21,802,250
31	Construction Management	9,339,300
	TOTAL	205,765,104

a/ October 2006 price levels.
b/ Includes mitigation lands.

TABLE 3
ECONOMIC SUMMARY
COMPREHENSIVE LEVEE PLAN

Item	Amount
First Cost ($)	205,765,000
Interest During Construction ($)	12,175,000
Total Investment ($)	217,940,000
Interest ($)	10,625,000
Sinking Fund ($)	1,084,000
Annual Operation and Maintenance ($)	123,000
Total Annual Cost ($)	11,832,000
Expected Annual Benefits ($)	13,981,000
Excess Benefits ($)	2,149,000
Benefit-Cost Ratio	1.20
Project Effectiveness (%)	79

DESCRIPTION OF LL PLAN

GENERAL

101. This alternative consists of upper and lower lakes along the Pearl River south of the Ross Barnett Reservoir. The lakes would extend from the Ross Barnett Reservoir outlet downstream along the Pearl River to approximately 3 miles southwest of Interstate 20. The combined lakes would cover approximately 4,727 acres (4,149 acres of the upper lake and 578 acres of the lower lake) at normal operating level. Weirs at both upper and lower lakes would regulate flows. The original LL plan proposed by local interests included two fixed crest weirs. The plan was modified from this original configuration for the purposes of constructability and flood damage reduction. Studies indicated that to significantly reduce flood damages, the upper weir would need to be a gated structure. The lakes would function as "flow thru" reservoirs with

minimal floodwater storage capacity. Flood protection would be provided by the project's lowering stages thru the Jackson Metropolitan Area. The LeFleur Lakes alternative is shown in Plate 4. Major components of the plan are discussed in the paragraphs below.

COMPONENTS OF LL PLAN

Weirs

102. The upper lake would be controlled by a hinge gate crest weir control structure approximately 800 feet long to be located immediately downstream of the Interstate 55 bridge crossing. The lower lake would be controlled by a fixed crest weir located approximately 3 miles downstream of Interstate 20. The upper lake would have a permanent pool elevation of 270.0 feet, NGVD, and the lower lake a permanent pool elevation of 260.0 feet, NGVD.

Channel Improvements

103. The plan includes major channel improvement on the Pearl River from the outlet of the Ross Barnett Reservoir to approximately 3 miles south of Interstate 20, a distance of approximately 16 river miles. Channel improvement includes excavating a 2,000-foot bottom width channel from River Mile (RM) 301.69 (outlet of Ross Barnett) to RM 292.63 (upstream of Lakeland Drive), a 1,500-foot bottom width channel from RM 292.4 (downstream of Lakeland Drive) to RM 288.5 (upstream of Interstate 55), and an approximate 1,000-foot bottom-width

channel from RM 288.2 (downstream of Interstate 55) to RM 284.0. At the request of the Mississippi Department of Transportation and Development, channel excavation will not be performed through any of the existing bridges or the proposed Airport Parkway bridge crossings. The total amount of channel material to be excavated is estimated at approximately 62,050,000 cubic yards.

LL Island and Disposal Areas

104. An island located at approximate RM 290.0 to RM 292.4 would be constructed from excavated material. The island would tie into high ground between the Lakeland Drive Pearl River relief opening bridge and the Pearl River Lakeland Drive bridge. This Island will be approximately 661 acres in size and will be encapsulated by a sheet pile retaining wall up to elevation 285.0 feet, NGVD. Access to the LeFleur Lakes Island will be from Lakeland Drive between the Pearl River bridge and the Pearl River relief opening bridge. Other disposal sites will be located along the Pearl River excavation reaches with the majority of the disposal being located in the overbank area from RM 293.5 to RM 296.0. These disposal sites will be filled to elevation 285.0 feet, NGVD. The island and disposal areas are shown on Plate 4. All disposal sites would be compacted to provide for commercial and other development opportunities.

Gallatin Street Landfill Removal

105. The Gallatin Street Landfill will be removed and excavated through and will be relocated to another landfill. The total amount of material to be removed is estimated at approximately 1.9 million cubic yards.

Utility Relocations

106. The extensive channel excavation and other plan components plan would require the relocation of numerous public utilities. Utilities requiring relocation include 4 natural gas lines, 11 communication lines, 9 electrical distribution lines, 2 drinking water lines, and 2 sanitary sewer lines.

Property Acquisition/Relocation

107. All lands lying in the lake footprint would be acquired in fee title. In addition, a 3-foot flowage easement would be acquired around the perimeter of the permanent pools (flowage easements from elevation 270.0 to 273.0 feet, NGVD, upper pool and 260.0 to 263.0 feet, NGVD, lower pool). Such flowage easements are typically included in Corps impoundments.

The portion of the LeFleur Bluff State Park lying in the Pearl River flood plain will be inundated with the minimum 270.0 feet, NGVD, upper lake pool elevation and require relocation.

Existing Jackson Levee (Fairground Levee)

108. The Jackson Levee will not require modification. However, the gravity outlets will be blocked by the 270.0-foot, NGVD, upper pool elevation which is between the existing 1- and 2-year frequency flowline on the Pearl River at this location. The existing 45-cfs capacity pump station will also not require modification; however, it will be operated to pump all inflows and will pump approximately twice as long from current conditions due to the gravity outlets being blocked. A riverside seepage berm will be required for the entire length of the existing levee along with a layer of riprap for toe protection.

Existing East Jackson Levee

109. The East Jackson Levee also will not need to be raised. The existing gravity outlet structure will be relocated downstream of the lower lake weir with a landside connecting channel to levee station 450+00. No pump modification will be required for the East Jackson Levee Pump Station. A riverside seepage berm will be required for the entire length of the existing

levee along with a layer of riprap for toe protection. A short section of this levee located near RM 291.0 will be relocated to the east to allow for construction of the LeFleur Lakes Island and associated channel improvements.

New Levees

110. Three new levee segments will also be needed to provide a comprehensive flood control plan for the Jackson Metropolitan Area. These include the Town and Lynch Creek Levee, South Jackson Levee, and the Richland Levee included in the comprehensive levee plan alternative. The Town Creek and Lynch Creek Levee will require pump stations on each creek since the lower lake pool elevation of 260.0 feet, NGVD, will be too high to provide gravity outlet flow. These levee segments are discussed below.

a. Town and Lynch Creeks Levee. This segment includes 7,195 feet of new levee. A pump station will be required on each creek with no gravity outlet structure. All inflows will be required to be removed by pumping similar to the existing Jackson levee discussed above. The lower lake pool elevation of 260.0 feet, NGVD, is too high to provide gravity outlet flow. Pump stations providing 2,500 cfs each will be required at stations 16+65 and 65+90. The drainage area of each creek is approximately 15 square miles. Approximately 2,400 feet of slurry trench will be required along the alignment. A riverside seepage berm will be required for the entire length of the new levee along with a layer of riprap for toe protection.

b. South Jackson Levee. This segment includes 19,863 feet of levee. An approximately 1,600-foot connecting ditch would be required along the landside toe upstream of Hardy Creek. A double 48-inch pipe would be required at station 37+79 and a double 9- by 9-foot box at station 165+34. Approximately 7,600 feet of slurry trench will be required.

c. Richland Levee. This segment includes about 26,434 feet of new levee. Approximately 3,200 feet of landside connecting ditch is included at the lower end of the levee. A floodgate will be required to include a single 36-inch pipe at station 31+50. A double 48-inch pipe floodgate will also be required at station 152+74. Local interests have requested the inclusion of a pumping station to remove interior ponding.

Mitigation Measures

111. The recommended compensation measure includes acquisition and reforestation of approximately 8,080 acres of frequently flooded cleared lands to offset adverse terrestrial impacts of the LL plan. The mitigation criteria for selection of land at the time of acquisition shown in the aforementioned Table 1 for the comprehensive levee plan would similarly apply to the LL plan.

SUMMARY OF LL PLAN

112. Table 4 shows a breakdown of the costs for the LL plan. An economic summary is shown in Table 5.

TABLE 4
SUMMARY OF FIRST COSTS a/
LL PLAN

Account	Item	Amount ($)
01	Lands and Damages b/ c/	176,263,497
02	Relocations	38,370,744
06	Fish and Wildlife Facilities	
09	Channels and Canals	776,615,685
11	Levees and Floodwalls	12,177,741
13	Pumping Plants	89,482,322
15	Floodway Control and Diversion Structures	60,287,514
30	Planning, Engineering, and Design	204,132,875
31	Construction Management	71,446,375
	TOTAL	1,428,776,753

a/ October 2006 price levels.
b/ Includes mitigation estimated at approximately $12,401,463.
c/ Excludes costs for relocating LeFleur Bluff State Park.

TABLE 5
ECONOMIC SUMMARY
LL PLAN

Item	Amount
First Cost ($)	1,428,777,000
Interest During Construction ($)	93,409,000
Total Investment ($)	1,522,186,000
Interest ($)	74,207,000
Sinking Fund ($)	7,569,000
Annual Operation and Maintenance ($)	3,175,000
Total Annual Cost ($)	84,951,000
Expected Annual Benefits ($)	16,052,000
Excess Benefits ($)	-68,899,000
Benefit-Cost Ratio	0.2
Project Effectiveness (%)	91

DESIGN AND CONSTRUCTION CONSIDERATIONS

113. Construction of the comprehensive levee plan would require approximately 4 years to complete. The LL plan is estimated to require approximately 8 years to complete. Project design will be based on current technical guidelines and additional engineering data or surveys that may be necessary. Remaining design requirements consist of preparation of plans and specifications for the weirs, pumping stations, island, various levee segments and drainage structures, and preparation of soil reports for various project components.

SUMMARY OF ECONOMIC, ENVIRONMENTAL, AND OTHER SOCIAL EFFECTS

114. Table 6 illustrates the environmental impacts for the comprehensive levee plan and the LL plan.

TABLE 6
SUMMARY OF ENVIRONMENTAL IMPACTS OF THE
COMPREHENSIVE LEVEE PLAN AND LL PLAN

Resource	Impacts
Comprehensive Levee Plan	
Terrestrial Habitat	Net loss of 2,503 AAHUs, 891 acres of bottom-land hardwoods, 60 acres of mixed-pine hardwoods, 34 acres of pine, and 39 acres of cypress-tupelo. Requires 1,680 acres of reforestation/management.
Aquatic Habitat and Fisheries	Temporary degradation of aquatic habitat with corresponding adverse impact to associated fisheries during construction. Borrow areas would create 778 acres of aquatic habitat.
Waterfowl Habitat	Reduction in forested flood plain would have minor adverse impacts to resident, and to a lesser extent, migratory waterfowl.
Water Quality	Increased turbidity and lowered DO levels during construction; no long-term significant impacts.
Ground Water	No impact expected
Endangered Species	No impact expected
Air Quality	Short-term releases of CO, NO, and particulates would be emitted during construction phase; no long-term adverse impacts.
Wetlands	Wetland conversion would total approximately 931 acres. Compensated by terrestrial mitigation.
Cultural Resources	No impact expected
LL Plan	
Terrestrial Habitat	Net loss of 2,183 AAHUs, 4,414 acres of bottom-land hardwoods, 934 acres of mixed-pine hardwoods, 272 acres of pine, and 1,150 acres of cypress-tupelo. Requires 8,080 acres of reforestation/management.
Aquatic Habitat and Fisheries	Temporary degradation of aquatic habitat with corresponding adverse impact to associated fisheries during construction. Borrow areas would create 4,730 acres of aquatic habitat.
Waterfowl Habitat	Reduction in forested flood plain would have minor adverse impacts to resident, and to a lesser extent, migratory waterfowl.
Water Quality	Increased turbidity and lowered DO levels during construction; no long-term significant impacts.
Ground Water	No impact expected
Endangered Species	Impacts to ringed sawback turtle and Gulf sturgeon due to loss of breeding habitat.

TABLE 6 (Cont)

Resource	Impacts
Air Quality	Short-term releases of CO, NO, and particulates would be emitted during construction phase; no long-term adverse impacts.
Wetlands	Wetland conversion would total approximately 2,200 acres. Compensated by terrestrial mitigation.
Cultural Resources	Not available at this time

115. Table 7 shows the System of Accounts. Four accounts (NED, Environmental Quality (EQ), Regional Economic Development (RED), and Other Social Effects (OSE)) are used to display impacts. These four accounts encompass all significant effects of a plan as required by NEPA of 1969 and social well-being as required by Section 122 of the Flood Control Act of 1970. The NED account shows effects on the national economy. The EQ account shows the effects on ecological, cultural, and esthetic attributes of significant natural and cultural resources that cannot be measured in monetary terms. The RED account shows the regional incidence of NED effects, income transfers, and employment effects. The OSE account presents the urban and community impacts and effects on life, health, and safety.

116. Other social effects are summarized in the following paragraphs.

117. Community cohesion and community growth will be strengthened from construction of either flood control plan due to the alleviation/reduction of flood damages and threat of flooding. No adverse impacts to community cohesion are anticipated.

TABLE 7
SUMMARY COMPARISON, COMPREHENSIVE LEVEE AND LL PLANS
PEARL RIVER WATERSHED, MISSISSIPPI

Item	Base Condition/Objectives (1994)	Without-Project Condition (No-Action)	Condition with Comprehensive Levee Plan	Condition with LeFleur Lakes
1. Description, Base Condition/Plan	Major need exists for alleviation or reduction of flooding from Pearl River. There are 6,551 residential and 1,630 nonresidential structures subject to flooding.	No construction of flood control project. With no-action or without-project conditions, needs described for area would not be met. Existing flooding and flood damages would continue.	Plan provides for 21.1 miles of new levees along the Pearl River and enlarging 11 miles of the existing Fairgrounds and East Jackson levees, constructing 18 gravity floodgates, and 168 acres of overbank clearing.	Plan provides for two lakes with a combined surface area of approximately 4,700 acres south of the Ross Barnett Reservoir. The lakes would extend a total distance of approximately 16 river miles from the Ross Barnett Reservoir to approximately 1 mile south of Interstate 20. Weirs at both the upper lakes would regulate flow. The plan also includes construction of a 619-acre island with excavated material and levees in south Jackson, Richland, and Town and Lynch Creeks.
2. Plan Impacts a/ a. National Economic Development (NED)	(Objective) Flood damage reduction for existing development in metropolitan area. Currently, average annual damages are $11.5 million.	No impact—objectives would not be met.	Net NED benefits are $2.1 million annually.	Net NED benefits are - $68.9 million annually.

TABLE 7 (Cont)

Item	Base Condition/Objectives (1994)	Without-Project Condition (No-Action)	Condition with Comprehensive Levee Plan	Condition with LeFleur Lakes
b. Environmental Quality (EQ)	(Objective) Preservation, protection, and enhancement of area's natural resources/environment.	The current value of most of the area's natural resources and environment will continue.	Plan includes a mitigation plan which would result in acquisition by fee of 1,680 acres of frequently flooded cleared lands to be reforested, increasing terrestrial and wetland resources. Plan will result in unavoidable losses, but mitigation plan replaces the impacted resources.	Plan includes a mitigation plan which would result in acquisition by fee of 8,080 acres of frequently flooded cleared lands to be reforested, increasing terrestrial and wetland resources. Plan will result in unavoidable losses, but mitigation plan replaces the impacted resources. Plan will result in unavoidable loss of that portion of LeFleur's Bluff State Park in the Pearl River flood plain. Park includes camping, day-use areas, fishing, and nature trails.
c. Regional Economic Development (RED)	(Objective) Improvements in regional economic growth and development (added employment, increase income, etc.).	Existing regional economic growth trends would continue.	Total income effects are reflected by total project-related benefits of $13.9 million annually. Project would provide for economic growth and development. Short-term impacts expected on employment/income from project construction.	Total income effects are reflected by total project-related benefits of _____ annually. Island components would provide for significant economic growth and development. Short-term impacts expected on employment/income from project construct.
d. Other Social Effects (OSE)	(Objective) Improvements in well-being of area residents, reflected by desirable economic growth, community cohesion, improvements in quality of life, removal/reduction in threat of flooding and flood damages, etc.	Existing area economic growth conditions would prevail. Threat of flooding and flood damages would continue.	Community cohesion would be strengthened over project life due to alleviation/reduction of flood threat and associated flood damages.	Community cohesion would be strengthened over project life due to alleviation/reduction of flood threat and associated flood damages and job opportunities associated with economic growth and development.

TABLE 7 (Cont)

Item	Base Condition/Objectives (1994)	Without-Project Condition (No-Action)	Condition with Comprehensive Levee Plan	Condition with LeFleur Lakes
3. Plan Evaluation a. Acceptability b/	Not applicable.	Unacceptable to local interests.	Acceptable. However, little support exists for the project.	Overall acceptability is unknown. Project is extremely controversial, having both strong support and opposition. Project is supported by community and business leaders due to its flood damage reduction and potential for cost recovery. Project is strongly opposed by environmental interest groups.
b. Completeness c/	Not applicable.	Not applicable.	Remaining flood control needs could be reduced through local flood control improvements.	Remaining flood control needs could be reduced through local flood control improvements.
c. Effectiveness d/	Not applicable.	Not applicable.	Overall, 79 percent reduction in damages.	Overall, 91 percent reduction in damages.
d. Efficiency e/	Not applicable.	Not applicable.	Excess benefits over costs (NED benefits) are $2.1 million annually.	Excess benefits over costs (NED benefits) are $-68.9 million annually.
e. Geographic Scope	Not applicable.	Encompasses study area (economic base area which includes Hinds and Rankin Counties), including the project area.	Encompasses the project area.	Encompasses the project area.
f. Hydrologic Effects	Not applicable.	Not applicable.	Plan includes measures to eliminate adverse hydrologic effects in the project area. No adverse hydrologic effects would occur downstream or upstream of the project area.	Plan includes measures to eliminate adverse hydrologic effects in the project area. No adverse hydrologic effects would occur downstream or upstream of the project area.

TABLE 7 (Cont)

Item	Base Condition/Objectives (1994)	Without-Project Condition (No-Action)	Condition with Comprehensive Levee Plan	Condition with LeFleur Lakes
g. Benefit-Cost Ratio	Not applicable.	Not applicable.	1.20	0.2
h. Reversibility	Not applicable.	Not applicable.	Possible, but highly improbable.	Possible, but highly improbable.
i. Stability	Not applicable.	Continued lack of needed flood protection would create continued significant flood damages and would be a deterrent to area growth and development.	With plan implementation, "medium stability" could be achieved.	With plan implementation, "medium stability" could be achieved.
j. Implementation Responsibility	Not applicable.	Not applicable.	Federal and non-Federal (local sponsor) actions required to implement plan.	Federal and non-Federal (local sponsor) actions required to implement plan.

a/ All impacts measured from "without-project" conditions.

b/ Acceptability is the workability and viability of the recommended plan with respect to acceptance by state and local entities and the public and compatibility with existing laws, regulations, and public policies.

c/ Completeness is the extent to which the recommended plan provides and accounts for all necessary investments or other actions to ensure the realization of the planned effects. This may require relating the plan to other types of public or private plans if the other plans are crucial to realization of the contributions to the objective.

d/ Effectiveness is the extent the recommended plan alleviates the specified problems and achieves the specified opportunities.

e/ Efficiency is the extent to which the recommended plan is the most cost-effective means of alleviating the specified problems and realizing the specified opportunities, consistent with protecting the nation's environment.

a. Implementation of flood control improvement plans are not expected to have any significant impact on study area population trends.

b. Noise created by project construction will be a temporary nuisance with the project area absorbing the impacts of these noises.

c. Any affected residences and businesses will be fully compensated under the terms of Public Law 91-646. Actual displacement will be determined during the plans and specifications phase.

d. Conversion of cleared lands to bottom-land hardwoods for mitigation purposes will provide beneficial impacts to the esthetic value of the area. Land disturbance during project construction will be remedied as construction is completed and vegetation recovers. Reduction in bottom-land hardwoods and wetlands due to project construction will create adverse impacts to esthetic values.

VIEWS OF LOCAL SPONSOR

118. The local sponsor, RHPRFDCD, understands the comprehensive levee plan is economically feasible, but has indicated they do not intend to pursue the plan at this time. The sponsor has indicated they plan to pursue the LL plan as a non-Federal project due to the plan's impact on regional economic growth of the Jackson Metropolitan Area and its potential for cost recovery.

SUMMARY OF COORDINATION, PUBLIC VIEWS, AND COMMENTS

119. Intense coordination has been maintained with the local sponsor. Quarterly meetings of the Executive Committee have been held throughout the study process. Engineers representing RHPRFDCD staff participated regularly during the past 3 years of this study.

120. Coordination has been maintained with state and Federal agencies. The U.S. Fish and Wildlife Service, the Environmental Protection Agency, NRCS, and MDWFP were invited to be cooperating agencies regarding the environmental aspects of the study.

SUMMARY OF FINDINGS

121. At HQUSACE direction, studies were limited to updating the comprehensive levee plan proposed in a draft January 1996 report to protect the Jackson Metropolitan Area and the LL

plan. The LL plan is designated as an LPP. To be recommended as a Federal flood control project, the LPP would have to be economically feasible and meet Federal water resource policy criteria.

COMPREHENSIVE LEVEE PLAN

122. The comprehensive levee plan consists of constructing approximately 21.9 miles of new levee, 3,720 feet of floodwall, enlarging 10.5 miles of the existing Jackson and East Jackson levees, building nine box culverts and nine concrete pipe water control structures, and constructing landside connecting ditches. Limited overbank clearing would be required to reduce stages at Lakeland Drive and minimize adverse impacts to the tailwater on the Ross Barnett spillway. This overbank clearing consists of a 100-foot strip on each side of the channel top bank from RM 290.5 to 301.5 and a 400-foot strip across six bendways. The levees would be fully compacted, have 1 vertical on 3 horizontal side slopes, a 10-foot-wide crown, and a 5-foot-thick impervious riverside face. For new levee closures required at highways, railroads, etc., an earthen and sandbag closure would be required.

123. The plan would result in the net loss of 891 acres of bottom-land hardwoods, 60 acres of mixed-pine hardwoods, 34 acres of pine, and 39 acres of cypress-tupelo. Mitigation requirements are estimated at approximately 1,680 acres of reforestation/management. Total project costs for the comprehensive levee plan are estimated at approximately $205,765,000. Investigations indicate this plan is economically feasible with a benefit-cost ratio of approximately 1.2.

124. The comprehensive levee plan is generally noncontroversial; however, little public support has been expressed for plan implementation.

LL PLAN

125. The LL plan includes upper and lower lakes along the Pearl River south of the Ross Barnett Reservoir. The lakes would extend from the Ross Barnett Reservoir outlet downstream along the Pearl River to approximately 3 miles southwest of Interstate 20. The combined lakes would cover approximately 4,727 acres (4,149 acres of the upper lake and 578 acres of the lower lake) at normal operating level. Weirs at both upper and lower lakes would regulate flows. The lakes would function as "flow through" reservoirs with minimal floodwater storage capacity. Flood protection would be provided by the project's lowering stages through the Jackson Metropolitan Area. Studies indicate the LL plan provides significant flood reduction in the upper reaches of the project area close to Ross Barnett Dam. However, for the plan to provide comprehensive flood control similar to the comprehensive levee plan, levees are needed in the lower reaches of the project area in the vicinity of the lower lake. Stages return to existing conditions downstream of the lower weir.

126. The upper lake would be controlled by a gated weir approximately 800 feet long located immediately downstream of the Interstate 55 bridge crossing. The lower lake would be controlled by a fixed crest weir located approximately 3 miles downstream of Interstate 20. The upper lake would have a permanent pool elevation of 270.0 feet, NGVD, and the lower lake a permanent pool elevation of 260.0 feet, NGVD.

127. The plan includes major channel improvement on the Pearl River from the outlet of the Ross Barnett Reservoir to approximately 3 miles south of Interstate 20, a distance of approximately 16 river miles. The total amount of channel material to be excavated is estimated at approximately 62,000,000 cubic yards. The Gallatin Street Landfill would be excavated through and relocated to another landfill. The total amount of material to be removed is estimated at approximately 1,900,000 cubic yards.

128. An island of approximately 661 acres connecting to high ground on the upstream end of the project between the Lakeland Drive Pearl River relief opening bridge and the Pearl River Lakeland Drive Bridge would be constructed from excavated material. Other disposal sites would be located along the Pearl River excavation reaches. All disposal sites would be compacted to provide for commercial and other development opportunities.

129. The Town and Lynch Creek Levee, South Jackson Levee, and the Richland Levee in the comprehensive levee plan are also included in the LL plan. The Town Creek and Lynch Creek Levee would also require pump stations providing approximately 2,500-cfs pumping capacity on each creek. All inflows will be required to be removed by pumping.

130. The plan would result in the net loss of 4,414 acres of bottom-land hardwoods, 934 acres of mixed-pine hardwoods, 272 acres of pine, and 1,150 acres of cypress-tupelo. Mitigation requirements are estimated at approximately 8,080 acres of reforestation/management. The plan would also result in the unavoidable loss of that portion of the LeFleur Bluff State Park lying within the Pearl River flood plain. Total project costs for the LL plan are estimated at approximately $1,428,775,000. The LL plan is economically infeasible, under Federal NED guidelines, with a benefit-cost ratio of approximately 0.2.

131. The LL plan is extremely controversial with downstream municipalities and other interests. Significant interest has been shown by various publics. Environmental groups oppose the plan largely due to its anticipated impact on natural resources and loss of a portion of the LeFleur Bluff State Park. Flood protection and regional economic development proponents support the plan due to the reduction in flood threat and economic development potential. As an indication of the controversial nature of the plan, the NEPA scoping meeting held in Jackson on 23 February 2004 was attended by approximately 400 individuals. An information meeting, at the request of the State Attorney General, was held on 11 March 2004 in Biloxi, Mississippi, with approximately 50 in attendance. Most in attendance at this meeting were opposed to the project based on perceived potential damages to coastal and marine resources.

CONCLUSIONS

132. The LL plan, as the LPP, is technically feasible, as formulated in this report, and would eliminate approximately 90 percent of the existing flood damages in the Jackson Metropolitan Area. The $1.4 billion cost estimate includes 25 percent contingencies (appropriate for a feasibility study), real estate requirements including mitigation, utility relocations, further engineering and design necessary for contract(s) award, construction, and construction management. The LL plan, under Federal guidelines, is economically infeasible with a benefit-cost ratio of 0.2. This benefit-cost ratio, in accordance with Federal water resource policy, is based on flood damage reduction benefits and not on regional/local development benefits, important to local decisionmakers, which may occur with non-Federal implementation. A regional economic study for the LL plan is being separately conducted by the non-Federal sponsor. The LL plan, as currently proposed, does not meet environmental policy objectives such as avoiding and minimizing impacts on existing habitat, a requirement when implementing a Federal project. A locally implemented plan could include measures to mitigate for any adverse environmental effects.

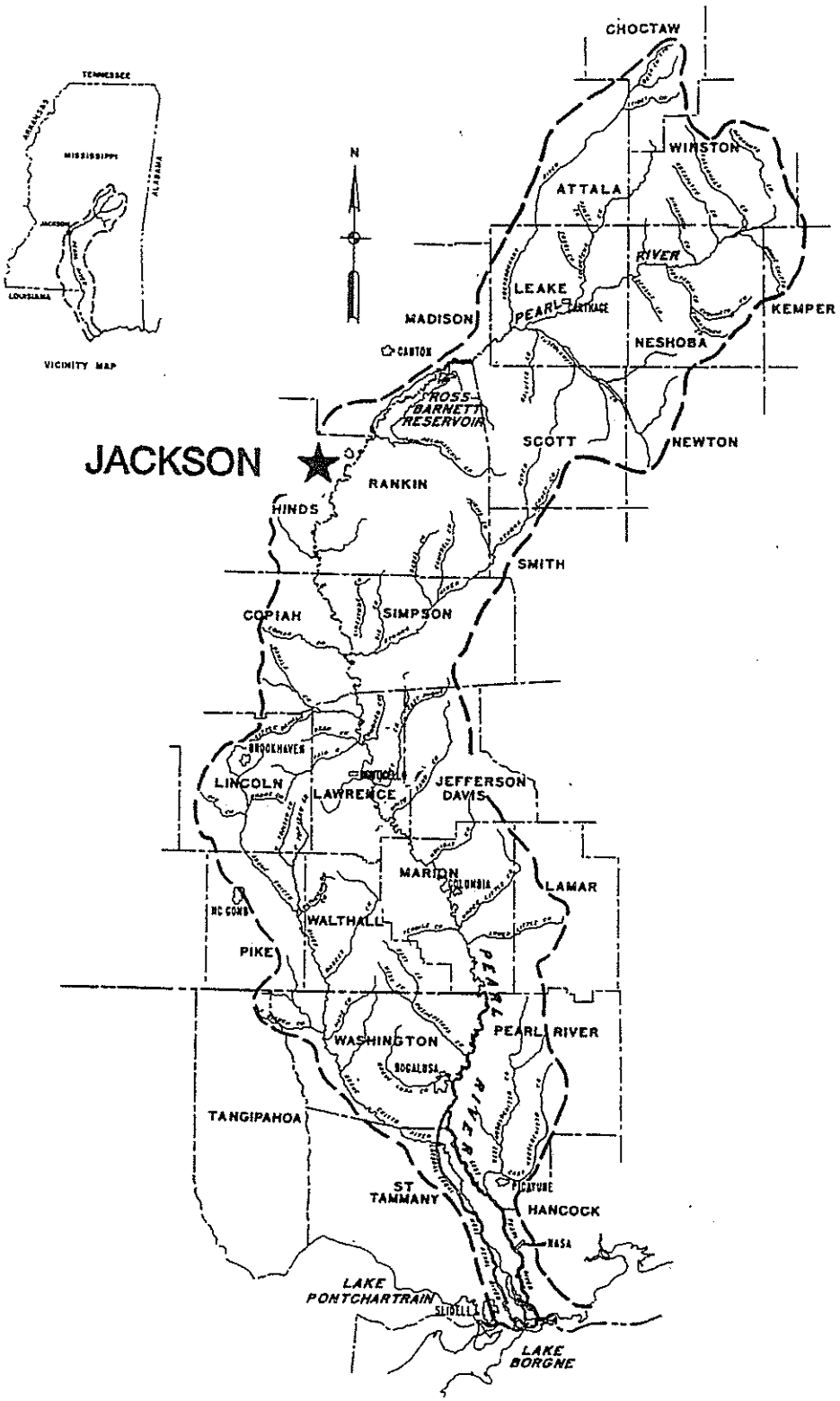
RECOMMENDATIONS

133. Based upon the study conclusions of the levee plan and the LPP, this feasibility study will be brought to a logical conclusion with this preliminary draft report/EIS documentation provided to the local sponsor for their use.

_____ _____

Anthony C. Vesay
Colonel, Corps of Engineers
District Engineer

Date

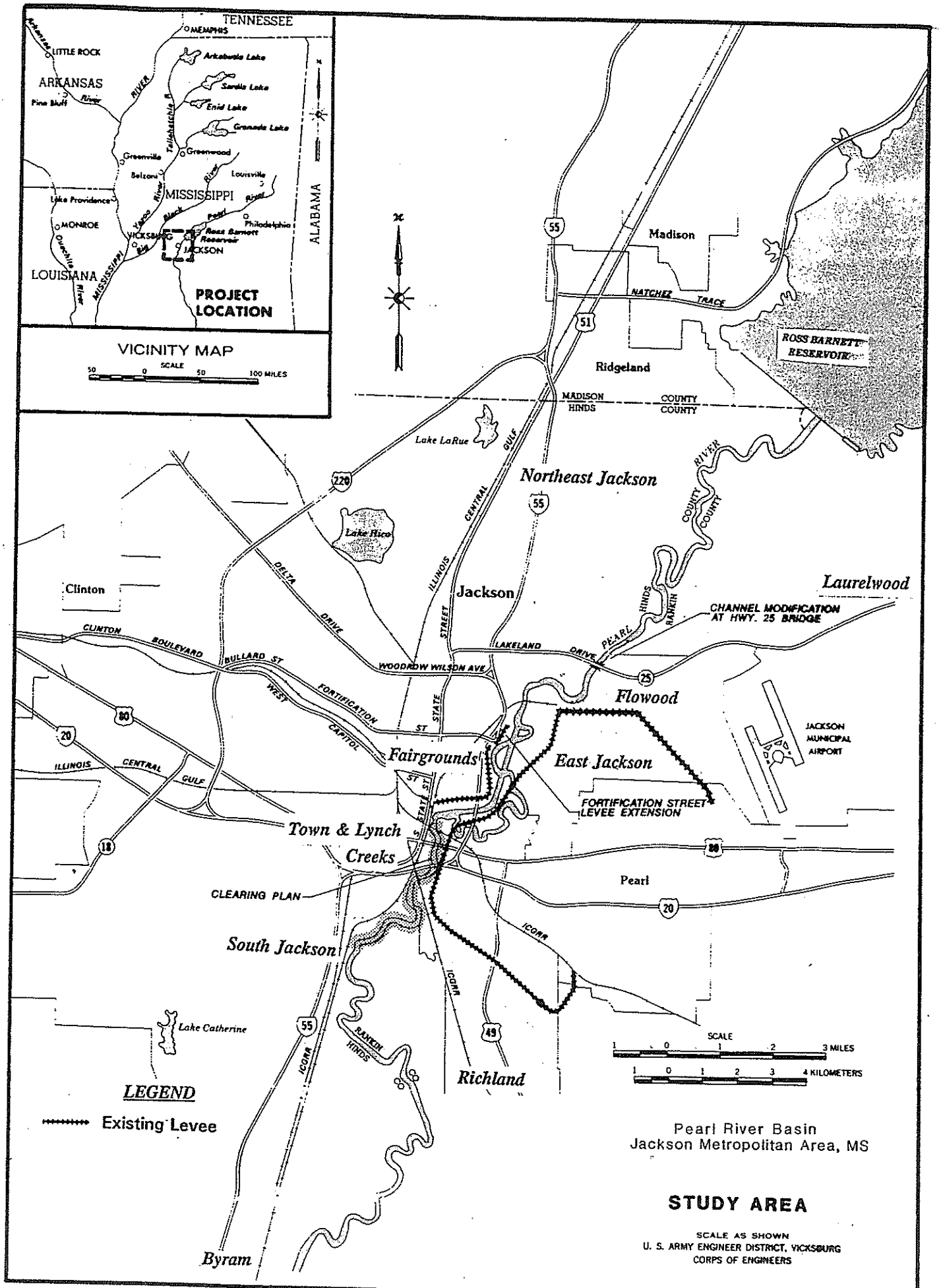


PEARL RIVER BASIN

MISSISSIPPI AND LOUISIANA

SCALE IN MILES

PLATE 1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Sardis Lake
Enid Lake
Grenada Lake
Greenville
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Belzoni
Louisville
Lake Providence
MISSISSIPPI
MONROE
VICKSBURG
Ross Barnett Reservoir
JACKSON
Philadelphia
ALABAMA
LOUISIANA
PROJECT LOCATION
VICINITY MAP
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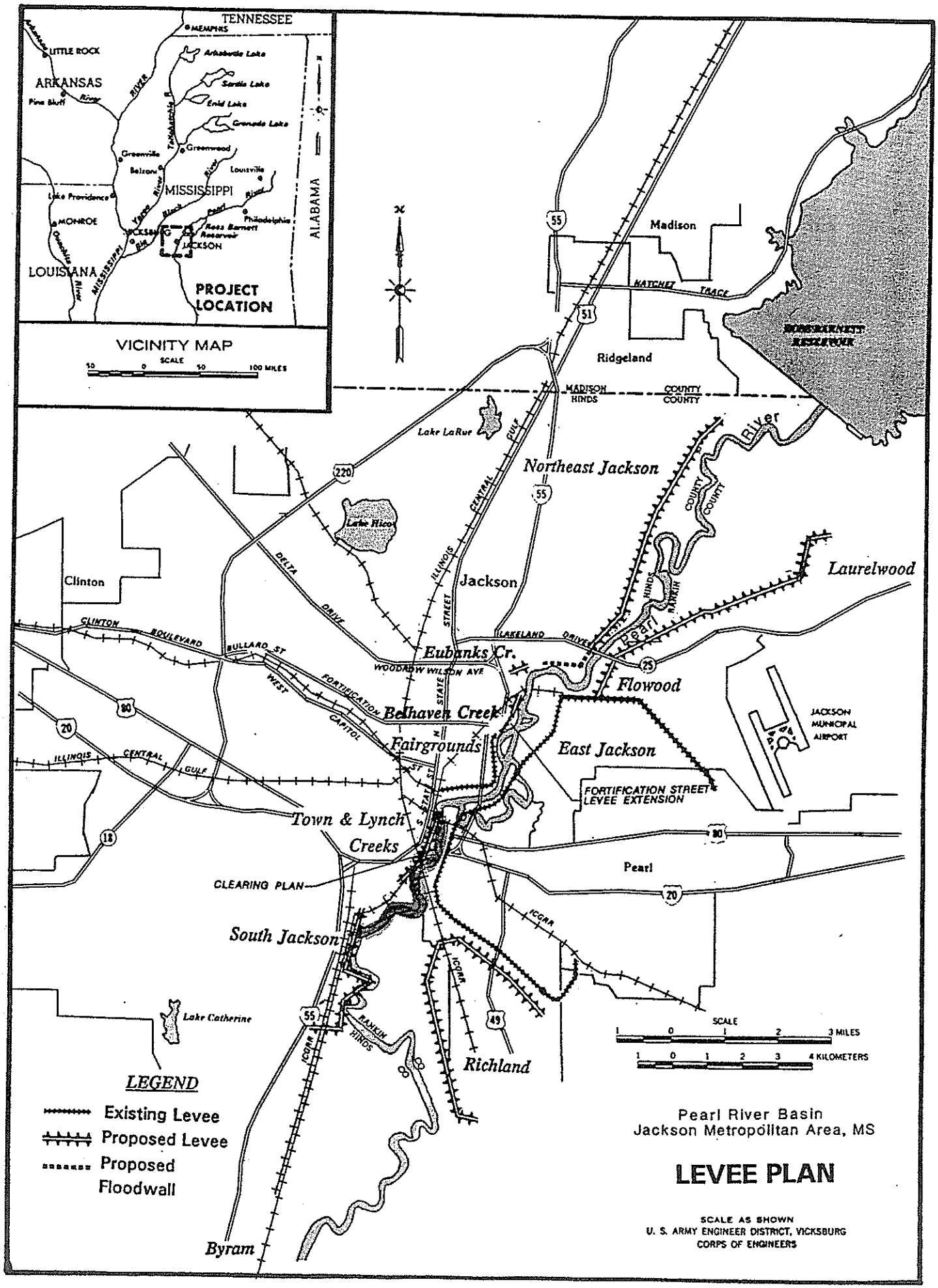
NATCHEZ TRACE
ROSS BARNETT RESERVOIR
Ridgeland
MADISON COUNTY
HINDS COUNTY
Lake LaRue
Northeast Jackson
Lake Hico
Clinton
Jackson
Laurelwood
CHANNEL MODIFICATION AT HWY. 25 BRIDGE
CLINTON BOULEVARD
BULLARD ST
WOODROW WILSON AVE
LAKELAND DRIVE
Flowood
JACKSON MUNICIPAL AIRPORT
Fairgrounds
East Jackson
FORTIFICATION STREET LEVEE EXTENSION
Town & Lynch Creeks
Pearl
CLEARING PLAN
South Jackson
ICGRR
Lake Catherine
Richland
Byram
SCALE
1 0 1 2 3 MILES
1 0 1 2 3 4 KILOMETERS
LEGEND
Existing Levee
Pearl River Basin
Jackson Metropolitan Area, MS
STUDY AREA
SCALE AS SHOWN
U. S. ARMY ENGINEER DISTRICT, VICKSBURG
CORPS OF ENGINEERS

PLATE 2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Greenwood
Belzoni
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MONROE
VICKSBURG
Ross Barnett Reservoir
JACKSON
LOUISIANA
ALABAMA
PROJECT LOCATION
VICINITY MAP
SCALE
50 0 50 100 MILES
Madison
Ridgeland
MADISON COUNTY
HINDS COUNTY
NATCHEZ TRACE
ROSS BARNETT RESERVOIR
Lake LaRue
Northeast Jackson
Pearl River
Lake Hico
Clinton
Jackson
Laurelwood
DELTA DRIVE
CLINTON BOULEVARD
BULLARD ST
WOODROW WILSON AVE
Eubanks Cr.
LAKELAND DRIVE
Flowood
WEST CAPITOL ST
FORTIFICATION
Belhaven Creek
Fairgrounds
East Jackson
JACKSON MUNICIPAL AIRPORT
FORTIFICATION STREET LEVEE EXTENSION
Town & Lynch Creeks
CLEARING PLAN
Pearl
South Jackson
ICGRR
Lake Catherine
RANKIN
Richland
Byram
LEGEND
Existing Levee
Proposed Levee
Proposed Floodwall
SCALE
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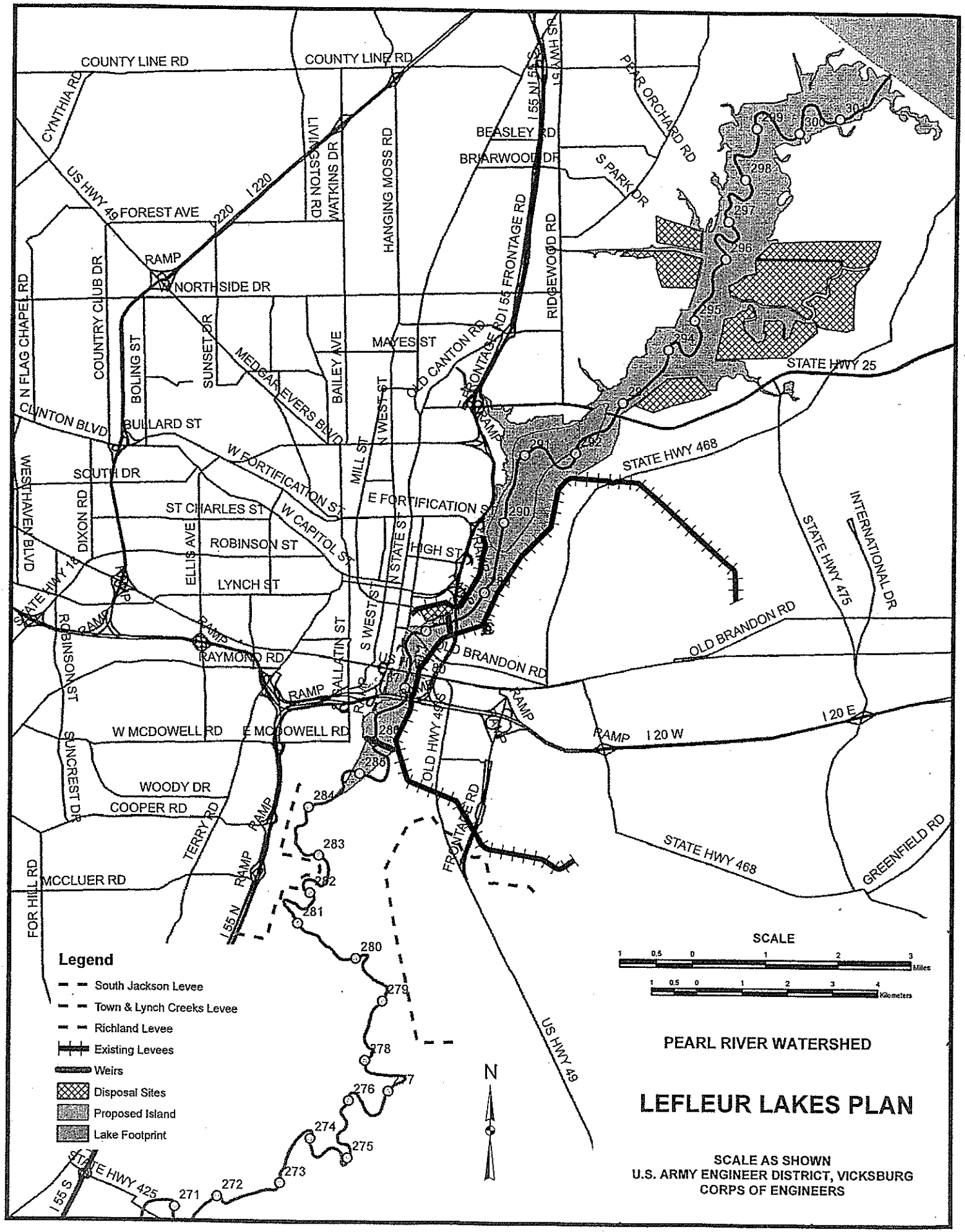
1 0 1 2 3 4 KILOMETERS
Pearl River Basin
Jackson Metropolitan Area, MS
LEVEE PLAN
SCALE AS SHOWN
U. S. ARMY ENGINEER DISTRICT, VICKSBURG
CORPS OF ENGINEERS

PLATE 2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CYNTHIA RD
US HWY 49
FOREST AVE
I 220
RAMP
W NORTHSIDE DR
N FLAG CHAPEL RD
COUNTRY CLUB DR
BOLING ST
SUNSET DR
MEDGAR EVERS BLVD
BAILEY AVE
MAYES ST
OLD CANTON RD
MILL ST
N WEST ST
CLINTON BLVD
BULLARD ST
W FORTIFICATION ST
E FORTIFICATION ST
SOUTH DR
ST CHARLES ST
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ELLIS AVE
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WEST HAVEN BLVD
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RAYMOND RD
US HWY 80
GALLATIN ST
S WEST ST
S STATE ST
ROBINSON ST
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SUNCREST DR
WOODY DR
COOPER RD
TERRY RD
MCCLUER RD
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STATE HWY 425
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HANGING MOSS RD
BEASLEY RD
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S PARK DR
PEAR ORCHARD RD
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FRONTAGE RD
RIDGEWOOD RD
STATE HWY 25
STATE HWY 468
STATE HWY 475
INTERNATIONAL DR
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FRONTAGE RD
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GREENFIELD RD
RAMP
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SCALE
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1 0.5 0 1 2 3 4 Kilometers
Legend
South Jackson Levee
Town & Lynch Creeks Levee
Richland Levee
Existing Levees
Weirs
Disposal Sites
Proposed Island
Lake Footprint
PEARL RIVER WATERSHED
LEFLEUR LAKES PLAN
SCALE AS SHOWN
U.S. ARMY ENGINEER DISTRICT, VICKSBURG
CORPS OF ENGINEERS

PLATE 4

PEARL RIVER WATERSHED
FEASIBILITY REPORT

DRAFT
ENVIRONMENTAL IMPACT STATEMENT
FEBRUARY 2007

PEARL RIVER WATERSHED, MISSISSIPPI
FEASIBILITY REPORT

DRAFT
ENVIRONMENTAL IMPACT STATEMENT

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PEARL RIVER WATERSHED, MISSISSIPPI

DRAFT
ENVIRONMENTAL IMPACT STATEMENT

INTRODUCTION

STUDY PURPOSE AND SCOPE

1. This report discusses the findings of feasibility studies for the Pearl River Watershed, Mississippi. These studies were conducted in partnership with the Rankin-Hinds Pearl River Flood and Drainage Control District (RHPRFDCD)--the non-Federal sponsor.

2. Previous studies conducted as a part of the comprehensive Pearl River Basin Study found Shoccoe Dam to be the best plan to address flooding problems in the Pearl River Watershed. Shoccoe Dam was authorized for construction by WRDA 86, but was subsequently determined to be unimplementable from a local interest standpoint. The Pearl River Basin Development District (PRBDD) and Hinds County Board of Supervisors requested the U.S. Army Corps of Engineers, Vicksburg District, undertake an investigation of alternative flood control measures. Reconnaissance studies for the Pearl River Watershed were completed in June 1990. These studies focused on evaluation of a comprehensive levee system consisting of approximately 24 miles of new levees and raising approximately 11 miles of the existing levees. Reconnaissance studies indicated that feasibility studies were warranted and a Feasibility Cost-Sharing Agreement (FCSA) was executed with PRBDD on 25 September 1991.

3. The resulting recommended plan documented in a January 1996 draft report was a comprehensive levee system to provide protection from the 1979 flood. The sponsor attempted on two occasions to obtain bonding authority from the state legislature. Both attempts were defeated largely in part to questions over the operation of the Ross Barnett Reservoir and downstream concerns over flooding and bank caving. The study action was suspended in July 1998 because the sponsor was unable to secure a source of funds for their share. The final feasibility report was never completed.

4. In 1996, local interests proposed the LeFleur Lakes (LL) plan, consisting of upper and lower lakes along the Pearl River south of the Ross Barnett Reservoir, as an alternative to the comprehensive levee plan. The lakes would extend from the Ross Barnett Reservoir outlet downstream along the Pearl River to approximately 1 mile southwest of Interstate 20. In order to create the lakes and adjoining flood-free land for commercial development, the plan proposed performing cut and fill operations on the Pearl River. The combined lakes would cover approximately 4,700 acres (4,100 acres of the upper lake and 600 acres of the lower lake) at normal operating levels. Weirs at both the upper and lower lakes would regulate flow.

5. At the request of local interests, an independent evaluation of the LL plan was conducted during June-December 2000 by an Architect-Engineer firm, URS, jointly selected and cost

shared equally by the Vicksburg District and PRBDD. The evaluation indicated that the LL plan could reduce Pearl River flooding in the Jackson area as would the levee plan, at an estimated project cost in excess of $300,000,000.

6. Meetings were held with PRBDD and RHPRFDCD on 5 September 2001 to discuss resumption of studies in Jackson, Mississippi, directed toward developing a compromise plan incorporating aspects of both the levee and lakes plans. Such a plan could potentially provide a high degree of flood protection, be economically feasible and environmentally sustainable, and be supported locally. The RHPRFDCD, in agreement with the PRBDD, indicated they would be the non-Federal sponsor for the resumed study. Based on meeting results, the Vicksburg District requested and received funds to prepare the Project Management Plan (PMP) and FCSA for negotiation with a non-Federal sponsor. Studies would have included all reasonable alternatives. The draft PMP prepared for developing a compromise plan was presented to RHPRFDCD in May 2002.

7. Subsequent to preparing the draft PMP, the non-Federal sponsor requested limiting feasibility studies to include only updating the levee plan recommended in the above-referenced January 1996 draft report, and analyzing only the LL plan. The LL plan could be designated the Locally Preferred Plan (LPP). The sponsor did not want to participate in a study which examined a reasonable array of alternatives. The PMP was revised to reflect a study limited to these two plans. During subsequent coordination activities with the non-Federal sponsor, it was determined that levees downstream of the proposed LL plan lower weir would be needed in

conjunction with the lakes. These areas included south Jackson and Richland. During the conduct of the study, it was determined that levees would also be needed in the Town and Lynch Creek areas. Therefore, studies included investigations of levees for south Jackson, Richland, and Town and Lynch Creeks as components of the LL plan. The FCSA, necessary to resume investigations of "Pearl River Watershed, Mississippi" suspended in July 1998, was signed with RHPRFDCD on 15 October 2003. The RHPRFDCD provided the majority of their 50 percent share of study costs by conducting work-in-kind.

8. The levee plan recommended in the previous study was the only levee plan included in these investigations. The LL plan was evaluated to the same detail as the levee plan. Project features were evaluated to ensure that the latest economic and environmental regulations for acceptability under Federal laws and regulations are met.

MAJOR CONCLUSIONS

9. The Jackson Metropolitan Area has major flooding problems with annual flood damages averaging approximately $12 million. The majority of these damages occur to residential development.

10. Alternative development and analysis was limited to updating of the previously proposed recommended levee plan from the 1996 Draft Jackson Metropolitan Area, Mississippi, feasibility report and an evaluation of the LL plan. Alternatives were analyzed to the extent

required for identifying the plan which best meets the needs based on the planning criteria. The LL plan was evaluated to the same detail as the previously proposed levee plans and was included as an additional alternative in the completed feasibility report.

AREAS OF CONTROVERSY

11. There were no major areas of controversy during the course of this study.

UNRESOLVED ISSUES

12. Except for remaining compliance requirements discussed in paragraph 12, there are no unresolved issues for this stage of planning.

RELATIONSHIP TO ENVIRONMENTAL PROTECTION STATUTES AND OTHER ENVIRONMENTAL REQUIREMENTS

13. The relationship of each alternative to the requirements of environmental laws, executive orders, memorandums, land use plans, and permits was evaluated (Table EIS-1). The Clean Water Act; Executive Order on Flood Plain Management; Executive Order on Wetlands; and requirements for hazardous, toxic, and radiological wastes (HTRW) are of particular importance.

TABLE EIS-1
ENVIRONMENTAL PROTECTION STATUTES AND REQUIREMENTS

Item	Alternative Compliance	
	Lefluer Lakes	1996 Recommended Plan
Federal Statutes		
Archeological and Historic Preservation Act, as amended, 16 U.S.C. 469, et seq.	Partial a/	Partial
Clean Air Act, as amended, 42 U.S.C. 7401, et seq.	Partial	Partial
Clean Water Act, as amended (Federal Water Pollution Control Act), 33 U.S.C. 1251, et seq.	Partial b/	Partial
Coastal Zone Management Act, as amended, 16 U.S.C. 1451, et seq.	N/A	N/A
Endangered Species Act, as amended, 16 U.S.C. 1531, et seq.	Partial	Full
Estuary Protection Act, 16 U.S.C. 1221, et seq.	N/A	N/A
Federal Water Project Recreation Act, as amended, 16 U.S.C. 460-1(2), et seq.	Full	Full
Fish and Wildlife Coordination Act, as amended, U.S.C. 661, et seq.	Partial	Full
Land and Water Conservation Act, as amended, 16 U.S.C. 4601, et seq.	N/A	N/A
Marine Protection, Research and Sanctuaries Act, 22 U.S.C. 1401, et seq.	N/A	N/A
National Historic Preservation Act, as amended, 16 U.S.C. 4321, et seq.	Partial d/	Partial
National Environmental Policy Act, as amended, 42 U.S.C. 4321, et seq.	Partial	Partial
Rivers and Harbors Act, 33 U.S.C. 401, et seq.	Full	Full
Watershed Protection and Flood Prevention Act, 16 U.S.C. 1001, et seq.	N/A	N/A
Wild and Scenic Rivers Act, as amended, 16 U.S.C. 1271, et seq.		N/A
Farmland Protection Policy Act	Partial	Full
Executive Orders, Memorandums, etc.		
Flood Plain Management (E.O. 11988)		Full
Protection of Wetlands (E.O. 11990)		Full
Environmental Effects Abroad of Major Federal Actions (E.O. 12114)	N/A	N/A
Federal Actions (E.O. 12114)	N/A	N/A
State and Local Quality Standards		
Mississippi Water Quality Standards	Partial b/	Partial b/
Land Use Plans	N/A	N/A

NOTES: The compliance categories used in this table were assigned on the following definitions:

a. Full Compliance. All requirements of the statute, executive order, or other policy and related regulations have been met for this stage of planning.

b. Partial Compliance. Some requirements of the statute, executive order, or other policy and related regulations remain to be met for this stage of planning.

c. Noncompliance. None of the requirements have been met for this stage of planning.

d. Not Applicable. Statute, executive order, or other policy not applicable.

a/ Full compliance will be established when Section 106 process is completed and coordinated with the State Historic Preservation office.

b/ Full compliance will be established when Water Quality Certification is obtained from the State of Mississippi.

CLEAN WATER ACT

14. The Section 404(b) (1) permit will be applied for and Section 401 Water Quality Certification will be obtained from the State of Mississippi prior to project construction.

EXECUTIVE ORDER ON FLOOD
PLAIN MANAGEMENT

15. Executive Order 11988 directs Federal agencies to reduce flood loss risk; minimize impacts on human safety, health, and welfare; and restore and preserve the natural and beneficial values served by flood plains. Agencies must consider alternatives to avoid adverse effects and incompatible development in the flood plain. If the only practical alternative requires action in the flood plain, agencies must design or modify their action to minimize adverse impacts.

16. Plan formulation included structural, nonstructural, and no-action alternatives. There was no alternative for location of project works outside the flood plain. All structural alternatives would adversely impact the natural environment. Where possible, levee alignments were designed to avoid ecologically sensitive areas.

17. Flood protection would not induce structural development within the flood plain. Since levee alignments were placed as close to existing development as possible, storage areas for interior runoff during flood events would need to be protected from development for the levee system to function properly. To ensure that this area remains free of induced development, a combination of perpetual easements and local zoning restrictions through the use of flood plain ordinances would be required.

EXECUTIVE ORDER ON WETLANDS

18. Executive Order 11990 directs Federal agencies to avoid, to the extent possible, long- and short-term adverse impacts associated with destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands if a practical alternative exists. Furthermore, agencies shall consider the action's effect on (a) public health, safety, and welfare; (b) maintenance of natural systems, including conservation and long-term productivity of existing flora and fauna, species and habitat diversity and stability, hydrologic utility, timber, and food and fiber resources; and (c) other wetland uses.

19. The proposed levees and borrow areas were located to minimize the impacts to bottom-land hardwoods and wetlands. Levee alignments were developed to leave as much acreage as possible on the riverside while providing for adequate storage of interior runoff. Where unavoidable adverse wetlands impacts are predicted plans include compensation measures to be implemented concurrently with project construction.

HAZARDOUS, TOXIC, AND
RADIOLOGICAL WASTES

20. Army Regulation 200-1, April 1990, and memorandum, ENVR-EH, 1 November 1990, subject: Real Property Transactions and Preliminary Assessment Screening (PAS), require a PAS for all real property transactions where the property is within the United States and involves a non-Army party.

21. A PAS determines whether HTRW were stored, released, or disposed of onsite. The PAS develops sufficient information to (a) adequately assess health and safety risks; (b) define the nature, magnitude, and extent of any environmental contamination; and (c) identify potential liabilities of the real property transaction.

22. During 1992, an aerial survey was conducted to identify hazardous/toxic waste dump sites which may impact levee construction. Eighteen potential sites were identified. Subsequent onsite investigations of the 18 areas revealed 4 sites that should be considered in developing the final alignment. A discussion of these sites is contained in Appendix 4.

23. In 2002, the Environmental Protection Agency (EPA) reported on data from the Creosote Slough property indicating elevated levels of metals and poly-aromatic hydrocarbons (PAH). The 2002 PAH data identified surface and subsurface soil in excess of some of the PAH screening levels. These locations for these samples are in areas which will be impounded if the LLP project is constructed.

LL PLAN

24. In 2006, EPA submitted additional data from the Creosote slough area which consist of analytical results for PAH from 4-surface water, 3-sediment, and 18-fish tissue samples. One sediment sample and one water sample reported PAHs above detectable concentrations. These results of these samples were compared to the EPA Region 6 screening levels and all were below the screening levels for tap water and residual soils. All 18 of the fish data results were reported as undetectable concentrations.

25. In January 2005, a Phase 1 HTRW Site Assessment was completed on the Gallatin Street Landfill to supplement the previous data collected for the 1996 study. Based on geotechnical reports there appear to be no hazardous material buried in the Gallatin Street Landfill which would exceed today's limits (Appendix 4).

NEED FOR AND OBJECTIVES OF ACTION

26. Congress, the Corps, and RHPRFDCD are responding to the need for urban flood protection.

AUTHORITY AND DIRECTION

27. Studies of the Pearl River Watershed were authorized by congressional resolutions adopted 9 May 1979. These authorizations read as follows:

> "Resolved by the Committee on Public Works and Transportation of the House of Representatives, United States, That the Board of Engineers for Rivers and Harbors is hereby requested to review the reports of the Chief of Engineers on Pearl River Basin, Mississippi and Louisiana, published as House Document Number 282, Ninety-Second Congress, Second Session, and other pertinent reports, with a particular view toward determining whether any further improvements for flood damage prevention and related purposes are advisable at this time. The alternatives are to be reviewed with local interests to insure a viable, locally supported project.

Resolved by the Committee on Public Works and Transportation of the House of Representatives, United States, That the Board of Engineers for Rivers and Harbors is hereby requested to review the report of the Chief of Engineers on the Pearl River and Tributaries, Mississippi, contained in House Document 441, 86th Congress, and other reports with a view to determining whether measures for prevention of flood damages and related purposes are advisable at this time, in Rankin County, Mississippi."

28. Authorization for construction of Shoccoe Dam is contained in Section 401(e) of WRDA 86 (Public Law 99-662) which reads as follows:

"(3) PEARL RIVER BASIN, INCLUDING SHOCCOE, MISSISSIPPI.--The Secretary is authorized to construct a project for the purpose of providing flood control for the Pearl River Basin in Mississippi, including, but not limited to, Carthage, Jackson, Monticello, and Columbia, Mississippi, consisting of--

(A) the project for flood control, Pearl River Basin, Mississippi: Report of the Chief of Engineers, dated March 17, 1986, at a total cost of $80,100,000, with an estimated first Federal cost of $56,070,000 and an estimated first non-Federal cost of $24,030,000; and

(B) for the purpose of providing flood control for the upstream areas of the Pearl River Basin in Mississippi--

(i) a combination roadway crossing of the Pearl River and floodwater detention and storage facility in east central Leake County, Mississippi;

(ii) a levee system in the south part of Carthage, Mississippi, which will upgrade, extend, and improve the protective levee system on the south side of Highway 16 in Leake County and the city of Carthage;

(iii) appropriate drainage structure and bridge modifications to expand and improve the stormwater conduits under Mississippi Highway 35, south of Carthage, Mississippi, for the purposes of reducing backwater influence for areas upstream of such highway;

(iv) upstream reservoirs on the Pearl River;

(v) such other structures as may be necessary to alleviate unforeseen flooding in the Leake County area as a result of the construction of the Shoccoe Dry Dam; and

(vi) channel improvements on the upstream Pearl River. For purposes of analyzing the costs and benefits of those portions of the project described in subparagraph (B), the Secretary shall take into account the costs and benefits of that portion of the project described in subparagraph (A)."

PUBLIC CONCERNS

29. The record flood of April 1979 at Jackson produced strong sentiments regarding the need for flood control measures at the earliest possible date. This public concern resulted in the proposed Shoccoe Dam alternative to provide flood protection for the area. While authorized, this alternative was never implemented. A scoping meeting was held in March 1992 in Jackson, Mississippi, during which concern was expressed for obtaining relief from flooding and for preserving and enhancing environmental quality. Interest was also expressed in the use of Ross Barnett Dam, a non-Federal project on the Pearl River above Jackson, for flood control.

30. After studies resumed in October 2003, a second scoping meeting was held on 23 February 2004 to discuss further plan details on a new alternative named LeFleur's Lake and emphasize the need for flood control in the Jackson area.

31. An information meeting was held in Biloxi, Mississippi, in March 2004 to discuss concerns of downstream impacts of the upstream activities, including long-term productivity of coastal fisheries, increase salinity, water quality, and the tourism industry.

PLANNING OBJECTIVES

32. In accordance with the Water Resources Council's Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (P&G), the Federal objective of water and related land resources planning is to contribute to National Economic Development consistent with protecting the nation's environment pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements.

33. As a result of the problem identification process, the objectives listed below formed the basis for the formulation of preliminary alternative plans. These objectives are in consonance with the intent of the P&G and other planning guidance.

a. Reduce flood damages to existing development within the Pearl River Watershed study area.

b. Minimize adverse environmental impacts through project design.

c. Compensate 100 percent for unavoidable environmental impacts.

PRELIMINARY SCREENING

34. The affected public provided assistance in identifying other issues to be evaluated. A scoping meeting was held in March 1992 at Jackson, Mississippi, during which concern was expressed for obtaining relief from flooding and for preserving and enhancing environmental quality. Also, a scoping meeting with approximately 400 in attendance was held in Jackson on 23 February 2004 to outline the study procedures and receive public input concerning the study process and problems in the area. An information meeting was held on 11 March 2004 in Biloxi, Mississippi, with approximately 50 in attendance.

35. A broad range of flood damage reduction measures was considered in the screening process during previous feasibility studies conducted for the Jackson Metropolitan Area. In particular, the Pearl River Basin Interim Report on Flood Control, July 1985, completed by the Mobile District, which recommended Shoccoe Dam and the 1996 draft Jackson Metropolitan Area, Mississippi, study, completed by the Vicksburg District that recommended a Comprehensive Levee Plan.

36. The conclusion reached in the 1996 Jackson Metropolitan Area feasibility report to recommend Comprehensive Levee Plan B would not change because environmental settings and hydrological conditions are essentially the same for the impacted acres. Therefore, according to the guidance from Headquarters, U.S. Army Corps of Engineers, only the no-action and recommended Comprehensive Levee Plan was carried forward and evaluated along with the locally preferred LL plan.

NO ACTION

37. A no-action alternative was considered, but it would not eliminate any of the damages the metropolitan area has historically experienced. This would result in continued flood damage, trauma, and serious disruptions to human endeavors in the capital area and associated impacts to the entire State of Mississippi.

COMPONENTS OF COMPREHENSIVE LEVEE PLAN

38. The Comprehensive Levee Plan consists of constructing approximately 21.9 miles of new levee, 3,720 feet of floodwall, enlarging 10.5 miles of the existing Jackson and East Jackson levees, building 9 box culverts and 9 concrete pipe water control structures, and constructing landside connecting ditches. Limited overbank clearing would be required to reduce stages at Lakeland Drive and minimize adverse impacts to the tailwater on the Ross Barnett spillway.

This overbank clearing consists of a 100-foot strip on each side of the channel top bank from RM 290.5 to 301.5 and a 400-foot strip across six bendways. Plates 4-V-1 through 4-V-17 in Volume II show the proposed alignment of the levee and the location of major drainage structures and landside connecting ditches.

39. . The levees would be fully compacted, have 1 vertical on 3 horizontal side slopes, a 10-foot-wide crown, and a 5-foot-thick impervious riverside face. Because of the 1 vertical on 3 horizontal landside slope, no roadway addition was considered. Any roadway crown addition would have added substantial construction and real estate requirements. For new levee closures required at highways, railroads, etc., an earthen and sandbag closure would be required. The Fairgrounds and East Jackson levee enlargements would be constructed on the landside of the existing levee to minimize the necessity of impervious clay materials. Additional borrow borings would be taken during the preparation of plans and specifications to confirm this.

Levee Segments

40. Northeast Jackson. The Northeast Jackson levee (shown on Plates 4-V-1, 4-V-2, and 4-V-3) begins in the Jackson Country Club area near County Line Road and extends southward along the west bank of the Pearl River to Lakeland Drive (Highway 25). This proposed levee

segment is approximately 5 miles long and has an average height of 22 feet. From Highway 25, a floodwall would extend south and westward to high ground just east of Eubanks Creek. This floodwall is required because of the highly developed area south of Lakeland Drive and the close proximity to LeFleur Bluff State Park (Mayes Lakes area).

41. Lakeland Drive Floodwall. This segment includes approximately 3,720 feet of floodwall and about 1,165 feet of levee. A single 36-inch pipe structure would be required at Station 291+11. Approximately 3,100 feet of slurry trench would be required.

42. Eubanks Creek. This segment, shown on Plate 4-V-3, begins at high ground just south of Lakeland Drive and extends southerly to Eubanks Creek, then continues in a westward direction to high ground. The levee would be 0.3 mile long and have an average height of 24.5 feet.

43. Belhaven Creek. The Belhaven Creek Reach, shown on Plate 4-V-4, is an extension of the existing Fairgrounds levee necessitated by an increase in the level of protection for that area. The levee begins at high ground along the shoulder of the northbound lane of Interstate 55. The average height of the levee is 25 feet and is approximately 0.3 mile long.

44. Town and Lynch Creeks. This reach of levee, shown on Plate 4-V-5, begins on high ground near the Old Brandon Road crossing on the Pearl River (Woodrow Wilson Bridge) and proceeds southerly along the west bank of the river. The levee crosses Highway 80 and Interstate 20 before tying into high ground just south of Lynch Creek. The levee is approximately 1.4 miles long and has an average height of 17 feet.

45. South Jackson. The South Jackson levee, shown on Plates 4-V-6 and 4-V-7, begins at high ground approximately 1 mile above the Jackson Sewage Treatment Plant and extends south along the west bank of the river until it reaches the disposal pond levees. A riverside enlargement of the perimeter levee around the plant would be required. The levee would then extend south from that point and ultimately tie back into high ground just north of Elton Road interchange on Interstate 55 south. Approximately 3.8 miles of levee would be required for this portion of the comprehensive levee system and the average height of the levee would be 10 feet.

46. Flowood. This levee, shown on Plates 4-V-8 and 4-V-9, originates on high ground at a point approximately 0.25 mile west of Fannin Road and 1.25 miles north of Highway 25 (Lakeland Drive) and extends southwesterly around a newly developed residential area. From this point, the levee would continue approximately parallel to Lakeland Drive before turning southwesterly to follow along the east bank of the Pearl River. After crossing Lakeland Drive, the levee would continue to follow the east bank of the river until intersecting the existing East Jackson levee just west of Highway 468. This segment of levee would be approximately 5.3 miles long and have an average height of 13 feet.

47. Richland. The Richland levee, shown on Plates 4-V-15 to 4-V-17, would be "U-shaped" around the city of Richland. It would begin at high ground east of Highway 49 and extend northwesterly across Highway 49 to a point near the Illinois Central Gulf Railroad (ICGR) embankment. From this point, the levee turns westerly until it crosses the ICGR embankment. Then the levee would extend southerly to high ground 0.25 mile southeast of the intersection of Old Highway 49 and ICGR. Approximately 5 miles of levee would be required for this portion of the levee system with an average height of 13 feet.

48. Jackson (Fairgrounds). The entire Jackson levee, shown on Plate 4-V-4, will be enlarged to raise it 3 to 5 feet to provide the same level of protection as the new levees. In addition, the extension along the Fortification Street ramp will be raised to the proposed levee design grade and be connected to the Belhaven Creek levee. This segment would be approximately 1,600 feet long.

49. East Jackson. Approximately 8.7 miles of the existing East Jackson levee, shown on Plates 4-V-10 to 4-V-14, would be raised approximately 2 to 6 feet to provide design flood protection. Also, a 0.5-mile extension would be required at the downstream end tying into the ICGR embankment just north of Childre Road. The upper limits of the levee enlargement would end near Highway 468.

Gravity Floodgates

50. Structures recommended to be built through the project levee are listed below.

a. Northeast Jackson.

(1) Station 25+30 - Two 60-inch-diameter concrete pipes.

(2) Station 110+93 - Two 12- by 12-foot box culverts.

(3) Station 147+18 - One 12- by 12-foot box culvert.

(4) Station 235+51 - Two 48-inch-diameter concrete pipes.

b. Floodwall extension. Station 291+11 - One 36-inch-diameter concrete pipe.

c. Eubanks Creek. Station 10+94 - Two 8- by 7-foot box culverts.

d. Fairgrounds extension. Station 9+64 - One 12- by 10-foot box culverts.

e. Town and Lynch Creeks.

(1) Station 16+65 - Three 12- by 12-foot box culverts.

(2) Station 65+90 - Three 12- by 12-foot box culverts.

f. South Jackson.

(1) Station 37+79 - Two 48-inch-diameter concrete pipes.

(2) Station 165+34 - Two 9- by 9-foot box culverts.

g. Flowood.

(1) Station 41+57 - Two 48-inch-diameter concrete pipes.

(2) Station 92+27 - One 48-inch-diameter concrete pipe.

(3) Station 175+05 - Two 6- by 5-foot box culverts.

(4) Station 197+24 - Two 36-inch-diameter concrete pipes.

(5) Station 257+94 - Two 8- by 6-foot box culverts.

h. Richland.

(1) Station 31+50 - One 36-inch-diameter concrete pipe.

(2) Station 152+74 - Two 48-inch-diameter concrete pipes.

Property Relocations

51. Due to the increase in stages between the proposed levees in the vicinity of Lakeland Drive, existing development on each side of Lakeland Drive on the west bank of the Pearl River would be adversely affected. Stages could increase by as much as 1 foot in this area with the larger floods. Early investigations revealed that a levee or floodwall could not be constructed around this development without acquiring many of the 28 buildings at this location. As a result, the Comprehensive Levee Plan includes total acquisition of this area. Two other commercial buildings adjacent to the Richland levee will likely require acquisition due to their proximity to Richland Creek.

Mitigation Measures

52. Following the detail design of the Comprehensive Levee Plan, compensation requirements were recomputed. The recommended compensation measure of acquisition and reforestation of frequently flooded cleared lands was evaluated. Based on the analysis in Appendix 2, approximately 1,680 acres would be required to offset adverse terrestrial impacts of the Comprehensive Levee Plan. Due to the fact that mitigation would be accomplished during construction of the project and all lands would be acquired from willing sellers, the specific location of the mitigation land cannot be determined until immediately prior to the time of acquisition. Table EIS-2 depicts the criteria used in the selection of the lands at the time of acquisition. Development measures proposed for the mitigation lands include planting of appropriate open areas in bottom-land hardwood species, establishing necessary access roads, surveying and establishing boundaries, and establishing a management headquarters.

SUMMARY OF COMPREHENSIVE LEVEE PLAN

53. Table EIS-3 shows a breakdown of the costs for the Comprehensive Levee Plan. An economic summary is shown in Table EIS-4.

TABLE EIS-2
MITIGATION SITE SELECTION CRITERIA

DRAINAGE BASIN LOCATION CRITERIA
1. Lower Pearl River Basin (south of Jackson and west of Interstate 59)
2. Upper Pearl River Basin (north of Jackson)
3. Bogue Chitto River Basin
4. Bayou Pierre River Basin
5. Mississippi Delta-Yazoo River Basin, Sunflower River Basin, etc.
6. Lower Big Black River Basin (west of Interstate 55)
7. Leaf River Basin
EXISTING LAND USE TYPE CRITERIA
1. Degraded wetlands in riverine flood plains; e.g., abandoned surface mines, actively farmed lands, pasture lands
2. Degraded upland forests in riverine flood plains
3. Cutover forested wetlands
4. Mature bottom-land forests
LAND REHABILITATION METHODS CRITERIA
1. Wetland restoration including replacement of hydrology and woody vegetation
2. Wetland reforestation where hydrology is in place
3. Reforestation of uplands associated with riverine habitats
4. Preservation of a unique habitat or a habitat important to a Federally listed threatened or endangered species
SPECIFIC LAND LOCATION CRITERIA
1. Sites adjacent to state management areas, national wildlife refuges, U.S. Forest Service lands, etc., that are managed for fish and wildlife
2. Sites adjacent to existing forested areas
3. Sites adjacent to farmed areas that would provide corridors between wooded areas
4. Sites adjacent to developed residential areas
5. Sites adjacent to developed commercial areas

TABLE EIS-3
SUMMARY OF FIRST COST a/
COMPREHENSIVE LEVEE PLAN

Account	Item	Amount ($)
01	Lands and Damages b/	67,282,446
02	Relocations	17,266,188
06	Fish and Wildlife Facilities	695,797
11	Levees and Floodwalls	64,256,458
15	Floodway Control and Diversion Structures	25,122,665
30	Planning Engineering and Design	21,802,250
31	Construction Management	9,339,300
TOTAL		205,765,104

a/ October 2006 price levels.
b/ Includes mitigation lands.

TABLE EIS-4
ECONOMIC SUMMARY
COMPREHENSIVE LEVEE PLAN

Item	Amount
First Cost ($)	205,765,000
Interest During Construction ($)	121,175,000
Total Investment ($)	217,940,000
Interest ($)	10,625,000
Sinking Fund ($)	1,084,000
Major Replacement ($)	
Annual Operation and Maintenance ($)	123,000
Total Annual Cost ($)	11,832,000
Expected Annual Benefits ($)	13,981,000
Excess Benefits ($)	2,149,000
Benefit-Cost Ratio (%)	1.2
Project Effectiveness (%)	79%

COMPONENTS OF LL PLAN

54. This alternative consists of upper and lower lakes along the Pearl River south of the Ross Barnett Reservoir. The lakes would extend from the Ross Barnett Reservoir outlet downstream along the Pearl River to approximately 3 miles southwest of Interstate 20. The combined lakes would cover approximately 4,727 acres (4,149 acres of the upper lake and 578 acres of the lower lake) at normal operating level. Weirs at both upper and lower lakes would regulate flows. The original LL plan proposed by local interests included two fixed crest weirs. The plan was modified from this original configuration for the purposes of constructability and flood damage reduction. Studies indicated that to significantly reduce flood damages, the upper weir would need to be a gated structure. The lakes would function as "flow through" reservoirs with minimal floodwater storage capacity. Flood protection would be provided by the project's lowering stages through the Jackson Metropolitan Area. The LL plan alternative is shown in Figure EIS-1. Major components of the plan are discussed in the paragraphs below.

Figure EIS-1

Weirs

55. The upper lake would be controlled by a hinge gate crest weir control structure approximately 800 feet long to be located immediately downstream of the Interstate 55 bridge crossing. The lower lake would be controlled by a fixed crest weir located approximately 3 miles downstream of Interstate 20. The upper lake would have a permanent pool elevation of 270.0 feet, National Geodetic Vertical Datum (NGVD), and the lower lake a permanent pool elevation of 260.0 feet, NGVD.

Channel Improvements

56. The plan includes major channel improvement on the Pearl River from the outlet of the Ross Barnett Reservoir to approximately 3 miles south of Interstate 20, a distance of approximately 16 river miles. Channel improvement includes excavating a 2,000-foot bottom width channel from RM 301.69 (outlet of Ross Barnett) to 292.63 (upstream of Lakeland Drive), a 1,500-foot bottom width channel from RM 292.4 (downstream of Lakeland Drive) to 288.5 (upstream of Interstate 55), and an approximate 1,000-foot bottom width channel from RM 288.2 (downstream of Interstate 55) to 284.0. At the request of the Mississippi Department of

Transportation and Development, channel excavation will not be performed through any of the existing bridges or the proposed Airport Parkway bridge crossings. The total amount of channel material to be excavated is estimated at approximately 62,050,000 cubic yards.

LeFleur Lakes Island and Disposal Areas

57. An island located at approximate RM 290.0 to 292.4 would be constructed from excavated material. The island would tie into high ground between the Lakeland Drive Pearl River relief opening bridge and the Pearl River Lakeland Drive bridge. This Island will be approximately 661 acres in size and will be encapsulated by a sheet pile retaining wall up to elevation 285.0 feet, NGVD. Access to the LeFleur Lakes Island will be from Lakeland Drive between the Pearl River bridge and the Pearl River relief opening bridge. Other disposal sites will be located along the Pearl River excavation reaches with the majority of the disposal being located in the overbank area from RM 293.5 to 296.0. These disposal sites will be filled to elevation 285.0 feet, NGVD. The island and disposal areas are shown on Figure EIS-1. All disposal sites would be compacted to provide for commercial and other development opportunities.

Gallatin Street Landfill Removal

58. The Gallatin Street Landfill will be removed and excavated through and will be relocated to another landfill.

Utility Relocations

59. The extensive channel excavation and other plan components plan would require the relocation of numerous public utilities. Utilities requiring relocation include 4 natural gas lines, 11 communication lines, 9 electrical distribution lines, 2 drinking water lines, and 2 sanitary sewer lines.

PROPERTY ACQUISITION AND RELOCATION

60. All lands lying in the lake footprint would be acquired in fee title. In addition, a 3-foot flowage easement would be acquired around the perimeter of the permanent pools (flowage easements from elevation 270.0 to 273.0 feet, NGVD, upper pool and 260.0 to 263.0 feet, NGVD, lower pool). Such flowage easements are typically included in Corps impoundments. The portion of the LeFleur Bluff State Park lying in the Pearl River flood plain will be inundated with the minimum 270.0 feet, NGVD, upper lake pool elevation and require relocation.

Existing Jackson Levee (Fairground Levee)

61. The Jackson levee will not require modification. However, the gravity outlets will be blocked by the 270.0-foot, NGVD, upper pool elevation which is between the existing 1- and 2-year frequency flowline on the Pearl River at this location. The existing 45-cubic-foot-per-second (cfs) capacity pump station will also not require modification; however, it will be operated to pump all inflows and will pump approximately twice as long from current condition due to the gravity outlets being blocked. A riverside seepage berm will be required for the entire length of the existing levee along with a layer of riprap for toe protection.

Existing East Jackson Levee

62. The East Jackson levee also will not need to be raised. The existing gravity outlet structure will be relocated downstream of the lower lake weir with a landside connecting channel to levee Station 450+00. No pump modification will be required for the East Jackson levee pump station. A riverside seepage berm will be required for the entire length of the existing levee along with a layer of riprap for toe protection. A short section of this levee located near RM 291.0 will be relocated to the east to allow for construction of the LeFleur Lakes Island and associated channel improvements.

New Levees

63. Three new levee segments will also be needed to provide a comprehensive flood control plan for the Jackson Metropolitan Area--Town and Lynch Creek, South Jackson, and Richland included in the Comprehensive Levee Plan alternative. The Town Creek and Lynch Creek levee will require pump stations on each creek since the lower lake pool elevation of 260.0 feet, NGVD, will be too high to provide gravity outlet flow. These levee segments are discussed below.

a. Town and Lynch Creeks levee. This segment includes 7,195 feet of new levee. A pump station will be required on each creek with no gravity outlet structure. All inflows will be required to be removed by pumping similar to the existing Jackson levee discussed above. The lower lake pool elevation of 260.0 feet, NGVD, is too high to provide gravity outlet flow. Pump stations providing 2,500 cfs each will be required at Stations 16+65 and 65+90. The drainage area of each creek is approximately 15 square miles. Approximately 2,400 feet of slurry trench will be required along the alignment. A riverside seepage berm will be required for the entire length of the new levee along with a layer of riprap for toe protection.

b. South Jackson levee. This segment includes 19,863 feet of levee. An approximately 1,600-foot connecting ditch would be required along the landside toe upstream of Hardy Creek. A double 48-inch pipe would be required at Station 37+79 and a double 9- by 9-foot box at Station 165+34. Approximately 7,600 feet of slurry trench will be required.

c. Richland levee. This segment includes about 26,434 feet of new levee. Approximately 3,200 feet of landside connecting ditch is included at the lower end of the levee. A floodgate will be required to include a single 36-inch pipe at Station 31+50. A double 48-inch pipe floodgate will also be required at Station 152+74. Local interests have requested the inclusion of a pumping station to remove interior ponding.

Mitigation Measures

64. The recommended compensation measure includes acquisition and reforestation of approximately 8,080 acres of frequently flooded cleared lands to offset adverse terrestrial impacts of the LL plan. The mitigation criteria for selection of land at the time of acquisition shown in Table EIS-2 above for the Comprehensive Levee Plan would similarly apply to the LL plan.

SUMMARY OF LEFLEUR LAKES PLAN

65. Table EIS-5 shows a breakdown of the costs for the LeFleur Lakes Plan. An economic summary is shown in Table EIS-6.

TABLE EIS-5
SUMMARY OF FIRST COST a/
LL PLAN

Account	Item	Amount ($)
01	Lands and Damages b/ c/	176,263,497
02	Relocations	38,370,744
06	Fish and Wildlife Facilities	
09	Channels and Canals	776,615,685
11	Levees and Floodwalls	12,177,741
13	Pumping Plants	89,482,322
15	Floodway Control and Diversion Structures	60,287,514
30	Planning Engineering and Design	204,132,875
31	Construction Management	71,446,375
TOTAL		1,428,776,753

a/ October 2006 price levels.
b/ Includes mitigation estimated at approximately $12,401,463.
c/ Excludes cost for relocating LeFleur Bluff State Park.

TABLE EIS-6
ECONOMIC SUMMARY
LL PLAN

Item	Amount
First Cost ($)	1,428,777,000
Interest During Construction ($)	93,409,000
Total Investment ($)	1,522,186,000
Interest ($)	74,207,000
Sinking Fund ($)	7,569,000
Major Replacement ($)	
Annual Operation and Maintenance ($)	3,175,000
Total Annual Cost ($)	84,951,000
Expected Annual Benefits ($)	16,052,000
Excess Benefits ($)	68,899,000
Benefit-Cost Ratio (%)	0.20
Project Effectiveness (%)	91

DESIGN AND CONSTRUCTION CONSIDERATIONS

66. Construction of the Comprehensive Levee Plan would require approximately 5 years to complete. The LL plan is estimated to require approximately 8 years to complete. Project design will be based on current technical guidelines and additional engineering data or surveys that may be necessary. Depending upon the plan recommended for implementation, remaining design requirements consist of preparation of plans and specifications for the weirs, pumping stations, island, various levee segments and drainage structures, and preparation of soil reports for various project components.

COMPARATIVE IMPACTS OF ALTERNATIVES

67. All construction alternatives would cause significant adverse impacts to terrestrial resources. Table EIS-7 presents a summary of the expected impacts from considered alternatives and also includes the required compensation, if applicable, for each alternative.

ENVIRONMENTAL DESIGN AND MEASURES TO MINIMIZE IMPACTS

68. Levee alignments were designed to leave as much area as possible on the riverside while providing for adequate storage of interior runoff. In addition, an alternative which would involve construction of a levee through Mayes Lakes State Park was rejected in favor of the floodwall adjacent to the businesses just outside the park. The proposed levee would have interfered with planned expansion of camping facilities, introduced an esthetically unpleasing site to the park setting, and contributed to the further fragmentation of bottom-land hardwood habitat in the basin.

TABLE EIS-7
COMPARATIVE IMPACTS OF ALTERNATIVES

Resource	No Action	Lefluer Lakes	Alternative B
Terrestrial Habitat	Existing conditions would continue. 31,075 acres of bottom-land hardwoods, 2,113 acres of mixed-pine hardwoods, 1,181 acres of pine, and 1,347 acres of cypress□tupelo.	Net loss of 12,737 AAHUs,4,414 acres of bottom-land hardwoods, 934 acres of mixed pine hardwoods, 272 acres of pine, 1150 acres of cypress-tupelo, and 702 acres of shrubland. Requires 8,080 acres of reforestion/management.	Net loss of 1,799 AAHUs, 891 acres of bottom-land hardwoods, 60 acres of mixed-pine hardwoods, 34 acres of pine, and 40 acres of cypress-tupelo and 379 acres of shrubland. Requires 1,680 acres of reforestation/management.
Aquatic Habitat and Fisheries	Existing habitat conditions and land use trends would continue. The Pearl River and its tributaries occurring within the pro-posed project area would continue to support an important fishery.	Temporary degradation of aquatic habitat with corre-sponding adverse impact to associated fisheries during construction. Lake area would create 4,730 acres of aquatic habitat.	Temporary degradation of aquatic habitat with corre-sponding adverse impact to associated fisheries during construction. Borrow areas would create 778 acres of aquatic habitat.
Waterfowl Habitat	Overall habitat conditions would remain the same, with some possible reduction due to urban encroachment.	Reduction in forested flood plain would have minor adverse impacts to resident, and to a lesser extent, migratory waterfowl.	Reduction in forested flood plain would have minor adverse impacts to resident, and to a lesser extent, migratory waterfowl.
Water Quality	Water quality would remain at current levels.	Increased turbidity and lowered DO levels during construction; no long-term significant impacts.	Increased turbidity and lowered DO levels during construction; no long-term significant impacts.
Ground Water	No impact	No impact expected	No impact expected
Endangered Species	No impact	Impacts to ringed sawback turlte and Gulf Sturgeon due to loss of breeding habitat.	No impact expected
Air Quality	Air emission and quality would remain at current levels.	Short-term releases of CO, NO, and particulates would be emitted during construc-tion phase; no long-term adverse impacts.	Short-term releases of CO, NO, and particulates would be emitted during construc-tion phase; no long-term adverse impacts.
Wetlands	Existing wetland habitat having reduced functional value would continue to be lost through encroachment.	Wetland conversion would total approximately 2,200 acres.	Wetland conver-sion would total approximately 931 acres. Compensated by terrestrial mitigation.
Cultural Resources	No impact	22 sites deemed significant and require further study.	No impact expected

MITIGATION (COMPENSATION) PLAN

69. With the exception of no action, implementation of either the Comprehensive Levee Plan or the LL plan would result in unavoidable adverse impacts to terrestrial and wetland resources. These expected adverse impacts would be minimized to the maximum extent possible through environmental design measures. The remaining terrestrial and wetland losses would be compensated 100 percent through acquisition and reforestation of 1,680 acres of marginal farmland for the Comprehensive Levee Plan and 8,080 acres of marginal farmland for the LL plan. The location and selection of lands will be based on a priority matrix and landowner surveys during the Planning Engineering and Design phase of the project. Mitigation would also include appropriate management improvements.

OPERATION AND MAINTENANCE REQUIREMENTS

70. The local sponsor will be responsible for 100 percent of the operation and maintenance of the project. Operation and maintenance manuals detailing operational requirements and preventative and corrective maintenance procedures for the various project features for either plan recommended for implementation will be prepared during the design and construction phases. Water control plans to document the operation of the floodgates, pumps, and gated weirs will be developed during the construction phase of the project.

71. Levee maintenance would consist of sod maintenance, primarily routine mowing, and replacement of gravel. Maintenance of the overbank and bendway clearing, and the connecting ditches at some of the structures will consist of spraying for vegetation control with EPA approved herbicides. Maintenance at the structures includes rust preventative measures, care of riprap on outlet channels, and vegetation control.

AFFECTED ENVIRONMENT

GENERAL DESCRIPTION

72. The Pearl River Watershed study area extends from the Ross Barnett Dam downstream to Byram. The Pearl River Basin in this area contains a diversity and abundance of fish and wildlife resources. The flood plain and main river, along with their associated forested wetlands, tributaries, sloughs, and oxbow lakes, provide habitat for many fish and wildlife species, supporting recreational use.

73. The Pearl River in the Jackson Metropolitan Area is a narrow, shallow river flowing over a sand, gravel, and mud substrate. The physical geography of the Pearl River is typical of many rivers found in the southeastern United States. The low stream gradient and broad, flat flood plain produces extensive meanders, natural cutoffs, oxbow lakes, overflow channels, old river

runs, and an extensively forested flood plain. The flood plain forests consist of highly diverse broad-leaved, deciduous bottom-land hardwoods interspersed with forested wetlands (cypress-tupelo gum associations).

74. Principal tributaries within the study area are Purple/Hanging Moss Creek, Eubanks Creek, Town Creek, Lynch Creek, Three Mile/Hardy Creeks, Caney Creek, Hog Creek, and Squirrel Branch.

75. Soils in the study area are mostly of the Cascilla-Chenneby association or Grenada silt loam. These soils range from poorly to well-drained and are fairly acidic silt loams are found in natural levees and flood plains. Other associations include Bonn-Deerford, Calloway, Oaklimeter, and Reidtown silt loams.

76. Vegetation in the study area is diverse and consists of typical forested wetland and upland tree species associations. Predominant habitat types include bottom-land hardwoods, cypress-tupelo/oxbow associations, pines, mixed pine-hardwoods, pasture/old field, cutover, open water, and urbanized areas.

CLIMATE

77. The climate within the study area is generally mild-subtropical, characterized by high winter and spring rainfalls with dry summers and autumns. The yearly mean temperature is 65 degrees F and the yearly mean high and low temperatures are 77 and 53 degrees F, respectively. Approximately 78 days of the year have temperatures above 90 degrees F and 50 days below 32 degrees F, with a frost-free season averaging 235 days. Relative humidity averages 79 percent and normal annual rainfall is about 57 inches.

HUMAN RESOURCES

78. The project area is located within the Jackson Metropolitan Area and includes portions of both Hinds and Rankin Counties, Mississippi. A very small portion of Madison County, Mississippi, is included in the project area (<1 percent). Given this, Madison County was not included in the discussion of the socioeconomic characteristics of the study area. The following discussion presents pertinent information relative to the demographic and economic characteristics of Hinds and Rankin Counties.

79. The 2000 U.S. Census Bureau data for Hinds and Rankin Counties revealed a population of 366,127 in the two-county area. With a population of 341,602 reported in the 1990 Census, this reflects an approximately 6.6 percent increase in the 10-year period. Further review of the Census data revealed that Rankin County had a population increase of approximately 32.3 percent while Hinds County showed a decrease in the same period of approximately -1.4 percent. Rankin County continues to show a significant population growth trend with previous increases of approximately 58 percent from 1970 to 1980 and approximately 26.3 percent from 1980 to 1990. The two-county area also contains approximately 12.8 percent of the total state population. More recent estimates made by the U.S. Census Bureau showed an estimated population of 373,782 in the two counties which would reflect an estimated 8.6 percent increase since the 1990 Census. Once again, the Rankin County estimates result in a projected 43.1 percent increase in population from 1990 to 2003 while Hinds County estimates reflect an approximately -2.1 percent decrease in populations during the same time period. These estimates are compared to an overall estimated increase in population in the State of Mississippi in the period from 1990 to 2003.

80. There are two primary factors that have traditionally affected the income of citizens living in the Hinds and Rankin County areas. One of these is related to Jackson being the State Capitol of Mississippi. In addition, the Jackson Metropolitan Area has been and continues to be the

largest urban area in the state. Associated with the historic significance of these two factors is the more recent increase in the overall economic growth within the area that have significantly influenced the reported changes in income for the two-county area in the 2000 Census. Since that time, the area has experienced more substantial economic growth associated with the construction of the Nissan North America Automotive Plant and other associated economic development activities. The 2000 per capita income (PCI) for the two-county area showed an increase of approximately 20.6 percent since 1990. The PCI in Rankin County increase an estimated 27.6 percent during the 10-year period while Hinds County showed an increase of approximately 11.4 percent during the same time period. The median household income for Rankin County increased to an estimated $44,946.00 in 1999. Hinds County reported an estimated increase to $33,991.00 in 1999.

LAND USE

81. In 1985, over 23 percent of the study area flood plain was devoted to urban development. Since that time, urban development, primarily residential and commercial development, has continued within the flood plain.

SIGNIFICANT RESOURCES

82. Significant resources are recognized by institutional, public, or technical criteria (Table EIS-8). Public recognition can include controversy, support, or opposition concerning a resource. Technical recognition is based on scientific knowledge or judgment or resource characteristics. The significance may be recognized by more than one criterion.

83. Significant natural resources in the project area also include the Pearl River and its flood plain. The dynamics of the Pearl River and its flood plain, which is typical of many coastal plain rivers of the southeastern United States, supports a highly diverse and complex floral and faunal assemblage which is dependent upon meanders, natural cutoffs, oxbow lakes, overflow channels, old river runs, and an extensively forested flood plain. Specific significant resources include waterfowl, bottom-land hardwoods, wetlands, threatened and endangered species, out-of-door recreational activities, and cultural resources.

TABLE EIS-8
INSTITUTIONAL RECOGNITION OF SIGNIFICANT RESOURCES
PEARL RIVER WATERSHED STUDY

Public Laws

Anadromous Fish Conservation Act, Public Law 89-304; 16 U.S.C. 757. et seq.

Antiquities Act of 1906, Public Law 59-209; 16 U.S.C. 431, et seq.

Archeological and Historic Preservation Act, Public Law 93-291, 16 U.S.C. 469, et seq. (also known as the Reservoir Salvage Act of 1960, as amended; Public Law 91-291, as amended; the Moss-Bennett Act; and the Preservation of Historic and Archeological Data Act of 1974).

Bald Eagle Act; 16 U.S.C. 668.

Clean Air Act, as amended, Public Law 91-604, 42 U.S.C. 1857h-7, et seq.

Clean Water Act, Public Law 92-500; 33 U.S.C. 1251, et seq. (also known as the Federal Water Pollution Control Act; and Public Law 92-500, as amended).

Coastal Zone Management Act of 1972, as amended, Public Law 92-583;
16 U.S.C. 1451, et seq.

Endangered Species Act of 1973, as amended, Public Law 93-205; 16 U.S.C. 1531, et seq.

Estuary Protection Act, Public Law 90-454; 16 U.S.C. 1221, et seq.

Farmland Protection Policy Act.

Federal Environmental Pesticide Control Act, Public Law 92-516; 7 U.S.C. 136.

Federal Water Project Recreation Act, as amended, Public Law 89-72;
16 U.S.C. 460-1(12), et seq.

Fish and Wildlife Coordination Act of 1958, as amended, Public Law 89-72;
16 U.S.C. 661, et seq. (also known as the Coordination Act).

Food Security Act of 1985, Public Law 99-198.

Historic Sites of 1935, as amended, Public Law 74-292; 16 U.S.C. 461, et seq.

Land and Water Conservation Fund Act, Public Law 88-578; 16 U.S.C.
460/-046/-11, et seq.

TABLE EIS-8 (Cont)

Public Laws (Cont)

Marine Mammal Protection Act of 1972, Public Law 92-522; 16 U.S.C. 1361, et seq.

Migratory Bird Conservation Act of 1928; 16 U.S.C. 715.

Migratory Bird Treaty Act of 1918; 16 U.S.C. 703, et Seq.

National Environmental Policy Act of 1969, as amended, Public Law 91-190; 42 U.S.C. 4321, et seq. (also known as NEPA).

National Historic Preservation Act of 1966, as amended, Public Law 89-665; 16 U.S.C. 470a, et seq.

Native American Religious Freedom Act, Public Law 95-341; 42 U.S.C. 1996, et seq.

Resource Conservation and Recovery Act of 1976, Public Law 94-580; 7 U.S.C. 1010, et seq.

Rivers and Harbors Act of 1899, 33 U.S.C. 403, et seq. (also known as the Refuge Act of 1899).

Submerged Lands Act of 1953, Public Law 82-3167; 43 U.S.C. 1301, et seq.

Surface Mining Control and Reclamation Act of 1977, Public Law 95-89; 30 U.S.C. 1201, et seq.

Toxic Substances Control Act, Public Law 94-649; U.S.C. 2601 et seq.

Watershed Protection and Flood Prevention Act,as amended, Public Law 83-566 16 U.S.C. 1001, et seq.

Wild and Scenic Rivers Act, as amended, Public Law 90-542; 16 U.S.C. 1271, et seq.

TABLE EIS-8 (Cont)

Executive Orders

Executive Order 11593, Protection and Enhancement of the Cultural Environment, May 13, 1979 (36 FR 8921; May 15, 1971).

Executive Order 11988, Floodplain Management, May 24, 1977 (42 FR 26951; May 25, 1977).

Executive Order 11990, Protection of Wetlands, May 24, 1977 (42 FR 26961; May 25, 1977).

Executive Order 11514, Protection and Enhancement of Environmental Quality, March 5, 1970, as amended by Executive Order 11991, May 24, 1977.

Executive Order 12088, Federal Compliance with Pollution Control Standards, October 13, 1978.

Other Federal Policies

Council on Environmental Quality Memorandum of August 11, 1980: Analysis of Impacts on Prime or Unique Agricultural Lands in Implementing the National Environmental Policy Act.

Council on Environmental Quality Memorandum of August 10, 1980: Interagency Consultation to Avoid or Mitigate Adverse Effects on Rivers in the Nationwide Inventory.

Migratory Bird Treaties and Other International Agreements Listed in the Endangered Species Act of 1973, as amended, Section 2(a)(4).

PRIME FARMLANDS

84. Pursuant to the Farmland Protection Policy Act, a Farmland Impact Rating form for the proposed levee and borrow construction areas was sent to the Hinds County Conservation District of the Natural Resources Conservation Service (NRCS) during the 1996 Jackson Metropolitan Area study.

WATERFOWL RESOURCES

85. Due to the highly urbanized nature of the Jackson Metropolitan Area, this part of the Pearl River Basin is not a major waterfowl area. However, the flood plain forests are used year-round by wood ducks and to a lesser extent by migratory waterfowl. Many of the oxbow lakes, old river channels, and other frequently flooded areas within the flood plain provide good brood-rearing habitat for wood ducks.

TERRESTRIAL RESOURCES

86. Wildlife resources within the Pearl River Basin are dependent upon the diverse composition of the flood plain forest. Habitat type is the single-most important determinant of wildlife species composition. Bottom-land hardwoods comprise the largest habitat type in the

flood plain forests in the study area and are extremely productive wildlife areas. Of the 490 wildlife species occurring within the Pearl River Basin, a high percentage utilizes bottom-land hardwoods as primary habitat for reproduction and/or feeding during all or a portion of the year. Bottom-land hardwoods interspersed with cypress-tupelo/oxbow associations add to the diversity and productivity of the flood plain ecosystem. Major areas of the flood plain above and below Jackson are composed of these habitats and provide much of the potential wildlife-oriented recreational use enjoyed by the residents of the Basin.

87. These habitats were evaluated using Habitat Evaluation Procedures (HEP) analysis to generate habitat units (HU) which is a function of habitat quality (Habitat Suitability Index (HSI) value) and habitat area (acres). One HU represents 1 acre of optimal habitat for a given species of animal. Evaluation species consisted of the barred owl, brown thrasher, eastern meadowlark, gray squirrel, slider turtle, swamp rabbit, and Carolina chickadee. Table EIS-9 displays average annual habitat units (AAHU), which is calculated using the species HUs annualized over the 100-year life cycle of the project and the 5- to 8-year construction period.

TABLE EIS-9
AVERAGE ANNUAL HABITAT UNITS FOR THE LL PLAN
AND COMPREHENSIVE LEVEE PLAN

Evaluation Species	Alternatives	
	LL Plan	Comprehensive levee Plan
Barred owl	252	9
Brown thrasher	357	12
Eastern meadowlark	218	8
Gray squirrel	165	11
Slider turtle	264	459
Swamp rabbit	99	17
Carolina chickadee	828	228
TOTAL	2,183	1,043

WETLAND RESOURCES

88. The 1987 Corps of Engineers Wetlands Delineation Manual with supplemental guidance was used as the basis for determining the extent of wetlands within the project area. Other regulated waters of the United States (e.g., rivers, lakes, and streams) were identified as jurisdictional areas. Due to the magnitude of the area to be delineated, the Corps used the 5 percent duration (offsite procedure of the 1987 manual) as the beginning point. The upper limits of jurisdictional areas meeting wetland hydrology are those which are flooded, ponded, or saturated for 5 percent of the growing season in most years. Elevations correlating to this criterion (flooding and ponding) were calculated from existing gage data and applied to topographical maps. In addition, onsite determinations were conducted to characterize

vegetation, soils, and hydrology as specified in the 1987 Corps manual. Site visits were conducted throughout the project area when permission was obtained from the landowner. Those areas where permission was not granted or the landowner could not be located, aerial photographs were used to assist in the preliminary jurisdictional determination.

AQUATIC RESOURCES

89. The Pearl River and its tributaries support a diverse fish population. This diversity depends to a great extent upon the varied aquatic habitats present and the relatively clean condition of the river. Fish-habitat data were collected in the study area during summer 2005 and used to characterize baseline conditions and develop habitat models to determine project impacts. Two distinct habitats were evaluated--the Pearl River below Ross Barnett Dam and the upper reach of Ross Barnett Reservoir.

90. A total of 479 individuals representing 44 species of fish were collected in the study area during summer 2005. Minnows (10 species) and sunfishes (9 species) were taxonomically dominant. Species richness (37 species) and mean (±SD) Shannon Diversity Index value (1.6±0.2) were higher below the dam than above (30 species, 1.4±0.2, respectively). Riverine species were more abundant below the dam. Except for a few smallmouth buffalo captured above the dam, suckers were found exclusively below the dam. Other riverine species found

only below the dam included paddlefish, silver chub, flathead catfish, white bass, and most darters. Sluggish flows in the river during summer and fall, primarily due to the pooling from the existing weir, provides adequate habitat for lacustrine species like sunfishes.

THREATENED AND ENDANGERED SPECIES

91. A request was sent to FWS on 2 June 2004, and they responded by letter of 8 June 2004 indicating that the threatened bald eagle (*Haliaeetus leucocephalus*) winters in the area around Ross Barnett Reservoir. The threatened ringed sawback (map) turtle (*Graptemys oculifera*) occurs in the Pearl River throughout the project area. Also, the threatened Gulf sturgeon (*Acipenser oxyrhynchus desotoi*) historically occurs in the Pearl River.

CULTURAL RESOURCES

92. Archaeology Mississippi, Inc., was contracted to complete a cultural resources survey over the entire project area. During 2003-2004, Archaeology Mississippi, built upon a previous investigation by Goodwin & Associates, Inc. (1990), surveyed the project's area of potential effect (APE), reevaluating previously recorded sites as well as analyzing the newly discovered sites. In addition, Archaeology Mississippi developed geomorphological models to better detect site locations and assess site conditions for central Mississippi cultural resources.

WATER QUALITY

93. The portion of the Pearl River between the Ross Barnett Reservoir Dam and the raw water intake structure at RM 290.6 is classified by the Mississippi Bureau of Pollution Control (MBPC) for public water supply. Between the intake structure and Byram, the Pearl River is classified for fish and wildlife.

94. A search of EPA's STORET database identified two water quality monitoring stations within the project area. The stations, which are monitored by MBPC, are located at the downstream side of the Ross Barnett Reservoir (21MSWQ 02485601) and at Byram (21MSWQ 02486500). Data available at the reservoir are limited to the period of 1974 to 1989. Data reported near Byram were between 1975 and 1992. Both sets of data are displayed in Table EIS-10. Summary statistics on heavy metal concentrations are depicted in Table EIS-11. Data on heavy metals are from the station at Byram only.

TABLE EIS-10
WATER QUALITY DATA

Parameter	Number of Samples	Mean	25% a/	Median	75% b/	Criteria
Pearl River at Ross Barnett Reservoir, Station 21MSWQ 02485601						
Temperature (°C)	109	18.9	12	19.8	27	<32.2
Conductivity (umhos/cm)						<500
pH	107	6.6	6.2	6.6	7.0	(6-8.5)
Dissolved Oxygen (mg/l)						>4
Turbidity (NTU)	15	26	23	29	32	
Total Suspended Solids (mg/l)	110	12.9	7	11	16	<1,000
Total Solids (mg/l)						
Total Phosphorous (mg/l)	92	0.20	0.09	0.13	0.23	<0.15
PO4 (mg/l)	16	0.20	0.04	0.07	0.18	
Nitrate (mg/l)	90	0.17	0.04	0.1	0.17	<1
TKN (mg/l)	109	0.91	0.67	0.80	1.10	<1
Ammonia (mg/l)	17	0.27	0.11	0.22	0.41	
Fecal Coliform (#/100 mL)	102	495	10	30	146	<400
Pearl River Near Byram, Mississippi, Station 21MSWQ 02486500						
Temperature (°C)	306	22.3	19.5	25.5	27	<32.2
Conductivity (umhos/cm)	186	120	75	140	160	<500
pH	191	6.4	6.1	6.5	6.8	(6-8. 5)
Dissolved Oxygen (mg/l)	179	5.8	4.2	6.1	6.4	<4
Turbidity (NTU)	48	42	26	35	45	
Total Suspended Solids (mg/l)	134	38	19	27	45	<1,000
Total Solids (mg/l)	9	135	105	120	138	
Total Phosphorous (mg/l)	128	0.41	0.17	0.28	0.54	<0.15
PO4 (mg/l)	31	0.285	0.045	0.13	0.36	
Nitrate (mg/l)	127	0.301	0.07	0.18	0.42	<1
TKN (mg/l)	151	1.419	0.9	1.28	1.8	<1
Ammonia (mg/l)	45	0.424	0.08	0.34	0.625	
Fecal Coliform (#/100 mL)	105	1,377	57	170	1,375	<400

a/ Exceeds state benchmarks standards 75 percent of the time.

b/ Exceeds state benchmarks standards 25 percent of the time.

TABLE EIS-11
SUMMARY STATISTICS OF HEAVY METALS
(Parts per Billion (µg/l)

Constituent	Mean	Minimum	Maximum	Action Level a/	Period
Arsenic	3.55	9.00	51.0	190.0	1991-1992
Cadmium	2.82	0.03	11.0	0.66	1976-1992
Chromium	0.82	0.10	1.0	120.0	1976-1992
Copper	4.20	0.10	13.0	6.5	1976-1992
Lead	8.20	0.50	23.0	1.3	1976-1992
Mercury	0.80	0.0002	1.0	0.012	1976-1992
Manganese	137.50	0.20	238.0	NS	1976-1992
Nickel	3.23	0.20	5.0	88.0	1976-1992
Zinc	8.00	0.02	10.0	59.0	1976-1992
Aluminum	332.25	207.00	510.0	NS	1991-1992

a/ Action level refers to EPA Freshwater Chronic Criteria.

95. The MBPC reports in their 1992 "Water Quality Assessment" that the Pearl River from below the reservoir to the water intake structure "partially supports its public water supply classification and is increasingly threatened by urban runoff and industrial point sources." Water quality data reported at the reservoir indicate that total phosphorous and fecal coliform exceed state benchmark levels. Total phosphorous levels reported at this station ranged from 0.09 to 0.23 milligram per liter (mg/L). The mean concentration, 0.20 mg/L, exceeds the state benchmark of 0.15 mg/L. Fecal coliform concentrations ranged from 1 to 6,000 colonies per 100 milliliters (mL). The state criteria for drinking water supplies are not to exceed 400 colonies per 100 mL. The 75th percentile range was 146 colonies per 100 mL indicating that the states criteria are exceeded less than 25 percent of the time.

96. The MBPC reported that the section of the stream below the water intake to above the Jackson wastewater treatment plant near RM 281 "partially supports its fish and wildlife classification due to urban runoff." The Pearl River at Byram is impacted by the city of Jackson's wastewater treatment plant and urban runoff which results in its supporting the recreation classification.

97. Water quality data reported near Byram indicate that total phosphorous, total kjeldahl nitrogen, and fecal coliforms exceed state benchmark levels. Total phosphorous levels ranged from 0.17 to 0.54 mg/L. The 25th percentile for total phosphorous was 0.17 mg/L which indicates that phosphorous exceeds the state benchmark of 0.15 mg/L over 75 percent of the time. Total kjeldahl nitrogen ranged from 0.9 to 1.8 mg/L. Total kjeldahl nitrogen exceeded the

state benchmark of 1 mg/L over 50 percent of the time. Fecal coliform concentrations ranged from 7 to 20,000 colonies per 100 mL. Fecal coliform concentrations exceeded the drinking water supply criteria over 75 percent of the time.

98. Of the 10 metals reported in Table EIS-10, the Mississippi Department of Environmental Quality has not established standards for two (manganese and aluminum). Two of the remaining metals (arsenic and mercury) exceeded the reported human health standard for concentration in water and organisms. Mean arsenic concentration during the 1991-1992 sampling period was 3.55 microgram per liter (µg/L) and mean mercury concentration from 1976 to 1992 was 0.80 (µg/L). State standards for arsenic and mercury are 0.0175 and 0.151 µg/L, respectively. In addition to the reported concentrations of the various heavy metals, low levels of DDT have been found in fish tissue samples.

99. During the summer of 2005, the U.S. Army Engineer Research and Development Center Environmental Laboratory conducted limited sampling in the Pearl River during their aquatic analysis of the study area. Table EIS-12 displays the mean water quality and hydraulic parameters measured in the Pear River during July and September 2005 above and below Ross Barnett Reservoir.

TABLE EIS-12
MEAN WATER QUALITY AND HYDRAULIC PARAMETERS

Reach	N	Mean	Std Dev	Minimum	Maximum
Above Reservoir Variable					
Water temperature, °C	5	28.1	1.3	26.5	29.7
Dissolved oxygen, mg/L	5	6.4	0.7	5.7	7.3
Conductivity, mmhos/cm	5	58.8	1.9	56.0	61.0
pH	5	6.2	0.6	5.5	6.7
Turbidity, NTU	5	12.8	4.6	8.5	18.1
Wetted width, ft	5	545.4	279.3	285.0	900.0
Depth, ft	5	4.6	3.0	11.7	19.2
Velocity, cm/sec	5	2.3	2.7	0.0	6.4
Discharge, cfs	5	356.7	366.7	0.0	790.0
Below Reservoir Variable					
Water temperature, °C	11	30.5	1.2	28.8	32.9
Dissolved oxygen, mg/L	10	6.7	0.7	6.0	7.8
Conductivity, mmhos/cm	11	79.2	44.4	59.0	210.0
pH	11	6.9	0.3	6.6	7.4
Turbidity, NTU	11	12.6	.2	6.1	19.8
Wetted width, ft	11	197.5	89.3	51.0	324.0
Depth, ft	11	5.4	2.6	0.9	10.3
Velocity, cm/sec	11	15.1	11.8	0.0	32.7
Discharge, cfs	11	623.9	431.1	0.0	1143.0

AIR QUALITY

100. Air quality for the entire State of Mississippi is considered good. The Jackson area meets air quality standards for all pollutants. The Mississippi ambient air quality standards, which have been adopted from National Ambient Air Quality Standards, are shown in Table EIS-13. Air quality is expected to remain good, with the exception of temporary degradation occurring during periods of adverse weather conditions; i.e., prolonged periods of hot, dry weather.

TABLE EIS-13
NATIONAL AMBIENT AIR QUALITY STANDARDS

Contaminant	Primary a/	Secondary b/
Sulfur Oxides	a/ 0.03 parts per million (ppm) annual arithmetic mean	0.5 ppm maximum 3-hour concentration not to be exceeded more than once per year
	b/ 0.14 ppm maximum 24-hour concentration not to be exceeded more than once per year	
PM_{10}	a/ 50 micrograms per cubic meter (µg/cu m) annual arithmetic mean	
	b/150 µg/cu m maximum 24-hour concentration not to be exceeded more than once per year	
Carbon Monoxide	a/ 9 ppm maximum 8-hour concentration not to be exceeded more than once per year	
	b/ 35 ppm maximum 1-hour concentration not to be exceeded more than once per year	
Ozone	0.12 ppm maximum 1-hour concentration with an expected exceedance of no more than 1 day per year based upon a 3-year average	
Nitrogen Oxides	0.053 ppm annual arithmetic mean	
Lead	1.5 µg/cu m maximum quarterly arithmetic mean	

SOURCE: Mississippi Department of Environmental Quality, Office of Pollution Control.
a/ Primary standards are air quality levels set to protect public health.
b/ Secondary standards are air quality levels set to protect the general welfare.

GROUND WATER

101. Practically all of the area's ground water is derived from precipitation and reaches the water table through infiltration and percolation. In general, ground water is relatively free from pollution and nearly constant in quality and temperature. The abundant ground-water resources which underlie the Pearl River Basin are generally of good to excellent quality. Aquifers in the Claiborne Group furnish practically all existing ground-water supplies in the northern one-third of the Basin. Although the underlying Wilcox Group occupies about 1,000 feet of the freshwater section in that area, it is virtually untapped for water supplies due to its greater depth and the availability of adequate water at more shallow depths. Beds of Miocene age constitute sources of ground-water supplies throughout the southern two-thirds of the Basin and are the only significant sources in about one-half of the Basin.

RECREATION

102. Both consumptive and nonconsumptive recreational opportunities are available in the Jackson Metropolitan Area. However, nonconsumptive activities predominate, with fishing in the Pearl River and its associated oxbow lakes representing the principal consumptive use.

103. LeFleur Bluff State Park complex is within the city of Jackson and project area. The Park was originally developed by the city of Jackson primarily for nonconsumptive recreational activities. In 1986, control and management were transferred to MDWFP. The Park complex facilities include a swimming pool, golf course, tennis courts, picnic areas, playgrounds, and hiking trails. The Mayes Lake area, part of the Park complex, consists of several ponds and oxbow lakes and camping facilities. It is used extensively for fishing and includes easy access and wooden piers for bank fishermen.

104. Immediately below the Ross Barnett Dam are picnicking facilities and access for fishermen and boaters. In addition, the levees surrounding the Jackson Metropolitan Area are used by joggers and, to a limited extent, horseback riders.

ESTHETIC RESOURCES

105. Much of the area near Jackson in the immediate vicinity of the Pearl River is forested and void of residential, commercial, or industrial development. This greenbelt provides a visually relaxing atmosphere for those persons wishing to escape the highly developed metropolitan area. The remaining nonforested land provides a visual diversity which varies in visual pleasantry depending on specific areas and tastes.

ENVIRONMENTAL CONSEQUENCES

STUDY CONSTRAINTS

106. The study areas for purposes of this evaluation are the areas included in the foot prints of the Comprehensive Levee Plan totaling 1,506 acres and the LL plan footprint encompassing 7,857 acres.

LAND USE

107. In 1985, over 23 percent of the study area flood plain was devoted to urban development. Since that time, urban development, primarily residential and commercial development, has continued within the flood plain. The Comprehensive Levee Plan has a total of 1,506 acres of forested land in the study area and the LL plan has approximately 7,857 acres of forested land in the study area. The Comprehensive Levee Plan would convert approximately 1,025 wooded acres and 481 cleared acres to project features. The LL plan would convert 6,770 wooded acres and 1,087 cleared acres to project features.

PRIME FARMLAND

108. The NRCS indicated that no prime, unique, statewide, or locally important farmlands would be impacted by project construction during the 1996 study.

WATERFOWL RESOURCES

109. The project area is not a major waterfowl production or wintering area. However, the reduction in forested flood plain would have minor adverse impacts to area wood duck population, which utilize the area year-round. To a lesser extent, migratory waterfowl which utilize the forested flood plain of the project area on a seasonal basis would be adversely impacted.

TERRESTRIAL RESOURCES

110. Unavoidable adverse impacts to wildlife species dependent upon forested habitat would result from implementation of the proposed project. The Comprehensive Levee Plan would require 1,025 forested acres and 481 cleared acres. Approximately 87 percent of the forested acreage impacted is bottom-land hardwood habitat. In comparison the LL plan will

require approximately 6,770 forested acres and 1,087 cleared. Approximately 65 percent of the forested acreage is bottom-land hardwood habitat. Both study area cover types are presented in Table EIS-14.

TABLE EIS-14
STUDY AREA COVER TYPE

Comprehensive Levee Plan	Acres	Percent	LeFleur Lakes Plan	Acres	Percent
Bottom-land Hardwood Forest Land	891	59.2	Bottom-land Hardwood Forest Land	4,414	56.2
Cypress-Tupelo Swamp	40	2.6	Cypress-Tupelo Swamp	1,150	14.6
Mixed Pine and Hardwood Forest Land	60	3.9	Mixed Pine and Hardwood Forest Land	934	1.9
Shrubland	379	25.2	Shrubland	702	8.9
Grassland	102	6.8	Grassland	385	4.9
Pine Forest Land	34	2.3	Pine Forest Land	272	3.5
Total	1,506	100.0	Total	7,857	100.0

111. Based on the terrestrial habitat evaluation, the Comprehensive Levee Plan would result in a net loss of 1,799 AAHUs and the LL plan would have a net loss of 12,737 AAHUs. Table EIS-15 summarizes the estimated net impacts to terrestrial resources for each alternative by evaluation species. The barred owl, brown thrasher, gray squirrel, swamp rabbit, and Carolina chickadee lost AAHUs under each alternative, while the slider turtle gained. This was due to the fact that borrow areas and the proposed lakes would create turtle habitat. For more specific information about the terrestrial impact evaluation, refer to Appendix 2.

TABLE EIS-15
ESTIMATED IMPACTS IN AVERAGE
ANNUAL HABITAT UNITS TO TERRESTRIAL HABITAT

Evaluation Species	Alternatives	
	LL Plan	Comprehensive Levee Plan
Barred owl	-2,655	-586
Brown thrasher	-98	-24
Eastern meadowlark	-78	389
Gray squirrel	-2,733	-506
Slider turtle	445	215
Swamp rabbit	-3,379	-704
Carolina chickadee	-4,239	-745
Total	-12,737	-1,799

WETLAND RESOURCES

112. Adverse impacts to wetlands can result from land use conversion or from altered hydrologic characteristics. Generally, land use conversion results in complete loss of wetlands function, while altering hydrologic characteristics results in partial reduction of function. For the most part, the habitat quality of the Pearl River flood plain in the study area is of lower value than the areas upstream and downstream of the project. This is because the flood plain in the Jackson area has been constricted by previously constructed levees and filling activities; thus, reducing wetland functional values.

113. Direct and adverse impacts to wetland resources would occur under each alternative. As discussed earlier, some direct impacts were avoided, where possible, by environmental design features that have been made a part of the project. Wetland conversion resulting from project construction would total 931 acres for the Comprehensive Levee Plan and 2,200 acres for the LL plan.

114. A 1990 Memorandum of Agreement (MOA) between the Department of the Army and EPA recommends that the sequence of avoidance, minimization, and compensation be used to offset wetland impacts. The MOA recommends that mitigation for wetland impacts requires a 1 to 1 functional replacement. The MOA further recommends a minimum of 1 to 1 acreage replacement in the absence of definitive, quantitative information on wetland functions. According to the MOA, the Comprehensive Levee Plan needs to mitigate for 931 acres of wetland conversion and the LL plan needs to mitigate for 2200 acres of wetland conversion. Presently the recommended terrestrial mitigation acres for each plan exceed the recommended ratio for mitigation needs for wetland conversion acres.

AQUATIC RESOURCES

115. The Comprehensive Levee Plan would entail 168 acres of overbank clearing, as well as maintaining approximately 74 acres of previously cleared land as open land. This would result in the loss of stable attachment sites for microvertebrates during seasonal flooding. The removal

of shade trees along the streambank could result in an increase in water temperature with a corresponding decline in some water quality parameters such as dissolved oxygen (DO). This could reduce the assimilative capacity, adversely impacting aquatic populations. However, the severity of any potential water quality impacts to the aquatic community due to overbank clearing would not be significant considering the volume of flow and the relatively short length of stream involved.

116. Project construction would result in an estimated 40 acres of cypress-tupelo habitat being lost with the Comprehensive Levee Plan and 1,150 acres of cypress-tupelo habitat being lost for the LL plan. The severity of the loss of the aquatic resources associated with this habitat would be minimized by the creation of borrow areas in the Comprehensive Levee Plan. The borrow areas would be constructed employing environmental design measures to enhance their value as an aquatic resource. The vitality and productivity of these aquatic habitats would also be enhanced by locating them riverward of the levees so that surface runoff rainwater and the cyclic natural periodic inundation of the flood plain can recharge them; i.e., allow the exchange of water, nutrients, and fish communities.

117. Through the creation of an additional 4,727 acres of pooled water with the LL plan, there will be adverse impacts to riverine guilds. An HSI of 0.04 for the proposed lake indicates that obligate riverine guilds will become rare or extirpated from the project area after construction is complete. Habitat guilds for facultative riverine guilds increased postproject due to increased water surface area of the lakes.

118. Major biological tradeoffs are evident with riverine species declining and lacustrian species increasing. Four potential mitigation techniques can be considered to offset adverse impacts to riverine guilds--reconnecting secondary channels, reconnecting or managing water levels of backwaters, protection/creation of gravel bars, and construction of in lake weirs to constrict flow and increase velocity. Detailed information on aquatic resources can be found in Appendix 7.

THREATENED AND ENDANGERED SPECIES

119. In accordance with Section 7(c) of the Endangered Species Act of 1973, as amended, the Vicksburg District prepared a Biological Assessment (BA) for the ringed sawback turtle (*Graptemys oculifera*), Gulf sturgeon (*Acipenser oxyrhynchus desotoi*), and bald eagle (*Haliaeetus leucocephalus*) to address potential impacts of project construction. Based upon the assessments completed, it has been determined that the proposed action is likely to adversely affect both the Gulf sturgeon and the ringed sawback turtle (Appendix 3).

CULTURAL RESOURCES

120. Overall, Archaeology Mississippi evaluated 67 sites covering the area's prehistoric and historic past. Of these 67 sites, Archaeology Mississippi determined that 22 sites were considered significant and required further testing. Should the project continue, sites found within the project footprint will need to be further tested and the project impacts to the significant sites will have to be considered. The Mississippi State Historic Preservation Office and the Mississippi Band of Choctaw Indians have reviewed this report and concurred with its findings. Details from the report can be found in Appendix 8.

121. There remains the potential for the inadvertent discovery of any yet-identified cultural resources throughout the APE. If such resources are encountered during the course of the project, they will be evaluated, assessed for effects, and mitigated in accordance with Federal laws and regulations [specifically 36 CFR Part 800.11(b)(2) and 35 CFR Part 800.6].

WATER QUALITY

122. During construction of the levees, all disturbed areas would be subject to increased soil erosion. Eroded material would be transported into small tributary streams and into the Pearl River. Increased sediment loads would result in increases in both suspended solids and turbidity. Increases in suspended solids may result in decreases in DO, decreased light penetration, and decreased photosynthesis. However, these impacts would be short in duration and would diminish once vegetation has reestablished. These impacts would be minimized by seeding disturbed areas as early as possible.

123. The removal of trees and vegetation resulting from land clearing would increase runoff and increase erosion. The likely impacts are the same as those cited in the previous paragraph. Also, these impacts would be short in duration and would diminish once vegetation is reestablished. The impacts would be minimized by seeding disturbed areas as early as possible. Hydrologic and hydraulic analysis indicated that the increase in sediment transport will be insignificant.

OVERBANK CLEARING

124. Clearing of lands along banks would result in the loss of bank canopy and vegetation. Bank canopy provides shading from extreme temperatures resulting from solar radiation. The removal of this canopy may result in higher temperatures and potential loss in DO. The removal of bank vegetation would increase soil erosion resulting in higher suspended solids and increased turbidity values. Decreases in DO, decreased light penetration, and decreased photosynthesis may occur. The herbaceous growth would return within 1 to 2 years to provide a sediment filtering capability, but it would take 10 to 15 years for the shading to be replaced. These impacts would be minimized by seeding disturbed areas.

CONTROL STRUCTURES

125. To maintain natural drainage, construction of 18 control structures is proposed for the Comprehensive Levee Plan. Impacts to water quality resulting from their construction include increases in soil erosion, suspended solids, and turbidities. The clearing of lands for construction and access of the control structures will increase soil erosion and result in increases in suspended solids and turbidities. These impacts would be short in duration and would diminish once vegetation is reestablished. These impacts would be minimized by seeding disturbed areas.

Subsequent to construction and reestablishment of vegetation, gravity outlet structures would benefit water quality by controlling drainage into the Pearl River during periods of heavy rainfall. This would allow for deposition of suspended solids, thus decreasing the amount of suspended solids entering the river.

126. The LL plan includes the installation of two weirs. The weir structures will regulate the water levels in the lakes providing additional aquatic habitat and reduce overbank flooding associated with high precipitation events.

GROUND WATER

127. The preponderance of the public water supply within the Jackson Metropolitan Area is supplied by the state's largest public surface water supply system which utilizes the Pearl River and the Pearl River Valley Water Supply District (PRVWSD) Ross Barnett Reservoir located just to the north of the project area. Even still, ground water is pumped from deep aquifers within the project area to supplement the surface water supply. Because the project area remains dependent upon ground-water supplies for both public and private uses, increases in ground-water withdrawals may eventually lead to additional utilization of the available surface water resources within the Jackson Metropolitan Area and specifically the PRVWSD Ross Barnett Reservoir.

RECREATION

128. A comprehensive recreation plan was developed by PRBDD as an integral part of the 1996 study. The plan consists of a trail system along the levee with day-use areas at strategic locations. The trails would originate in northeast Jackson and extend to the floodwall segment, extend along the Fairgrounds, Town and Lynch Creeks, and South Jackson segments. On the Rankin County side of the Pearl River, the trail would extend along the East Jackson levee and proposed Flowood levee from old U.S. Highway 49 to the vicinity of Airport Road. Additional features to include a boat launch, comfort station, picnic area/pavilion, open play field, amphitheater, and parking area are planned for the island location on Lakeland Drive. The implementation of these recreational features would contribute to meeting urban recreational use demands in a manner compatible with private lands adjacent to the river and potential significant changes in river stages.

ESTHETIC RESOURCES

129. Project implementation would necessitate the removal of both trees and herbaceous vegetation during construction. This unavoidable loss of greenbelt would degrade the area's esthetic value. The esthetic degradation would be ameliorated after construction by reseeding disturbed areas. In addition, there would be some landscaping associated with recreational areas, while others would be allowed to reforest naturally.

MITIGATION (COMPENSATION)

130. Compensation, based on HEP analysis, for unavoidable adverse project impacts requires the acquisition and reforestation of 1,680 acres of marginal farmland for the Comprehensive Levee Plan alternative and 8,080 acres of marginal farmland for the LL plan. In accordance with Section 906(a) (1) of WRDA 86, mitigation lands would be acquired concurrently with lands and interests for project purposes. While the location of potential lands has not been identified, selection would be based on a priority matrix and landowner surveys. The priority matrix considers drainage basin location, existing land use, land rehabilitation methods, and specific location. Land acquired for mitigation would be exempt from taxes. However, removal of marginal farmland from agricultural production would not cause significant adverse impacts to farm employment or related farm support operations and/or businesses. If the compensation land is Federally owned, the county in which the land is located would receive a portion of the receipts from the sale of any products; e.g., timber, associated with the land. Whether the land is Federal, state, or locally owned, any increase in public use on the area by hunters, wildlife photographers, or others would impact favorably on the local economy of the area since much of the needed supplies and equipment would be purchased locally.

SECTION 122 ITEMS

131. The 1970 River and Harbors Act (Public Law 91-611), Section 122, requires impacts on the following items to be addressed.

NOISE

132. Construction and maintenance of any of the structural alternatives would cause temporarily elevated background noise levels because of the equipment used. Due to the temporary nature of the disruption, there would not be any significant effect upon the Jackson Metropolitan Area. Also, since most of the area is highly developed, elevated noise levels from construction would not result in a significant disruption to the area's activities.

DISPLACEMENT OF PEOPLE

133. The project would reduce urban flooding and the associated financial hardships. None of the alternatives would result in the displacement of residential households.

ESTHETIC VALUES

134. Refer to the Affected Environment and Environmental Consequences Sections.

COMMUNITY COHESION

135. All of the structural alternatives would contribute significantly to community cohesion by providing protection against certain levels of potential flooding. This would contribute directly to the stability of the area's economy and lifestyles of people living in the Jackson area.

LOCAL GOVERNMENT FINANCE
TAX REVENUES AND PROPERTY VALUES

136. Local government finance considers tax bases, property values, and tax revenues. These items impact the financial condition of local governmental units and often determine the level and quality of necessary local public services. Public revenues and expenditures would not be significantly affected. Project implementation would generate net positive benefits for the governmental sector.

PROPERTY VALUES

137. Property values would likely rise due to reduced flood risks, subsequent to project implementation.

DISPLACEMENT OF BUSINESS

138. Implementation of the proposed projects would require the acquisition and displacement of 32 commercial facilities on Lakeland Drive between the northeast Jackson and Flowood levee segments. Also, three facilities in the Richland levee segment area would be displaced.

PUBLIC SERVICES AND FACILITIES

139. Local governments provide basic public services including education, police protection, various county social welfare services, and road and bridge maintenance. Flood protection would improve the ability of local governments to provide and maintain public services and facilities.

COMMUNITY AND REGIONAL GROWTH

140. The project would benefit community and regional growth in the Jackson Metropolitan Area by reducing the potential for flooding. This would contribute to area stability and growth.

EMPLOYMENT

141. Construction, operation, and maintenance of the project would have a short-term positive impact on employment. However, long-term employment trends in the area would not be significantly impacted.

AIR QUALITY

142. The project would not affect long-term air quality.

RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF SOCIETY'S ENVIRONMENT AND THE MAINTENANCE OF LONG-TERM PRODUCTIVITY

143. Flood control benefits and adverse environmental impacts represent tradeoffs between the local short-term use and the long-term stability and productivity of society's environment.

144. The projects would reduce urban flooding and its associated financial and psychological hardships. Flood protection would improve the ability of local governments to provide and maintain public services, including education, police protection, road and bridge maintenance,

and various other social services. The stability of the area is based on the continuation of an urban economy. Flood reduction in the area would aid the continued existence of this economy and reduce the fragmentation and duress associated with major flood events on the community. These benefits, however, will produce some adverse impacts to the natural environment.

145. Project construction would entail converting 481 acres of open land and 1,025 acres of forested land to project features for the Comprehensive Levee Plan and the LL plan would convert 6,770 wooded acres and 1,087 cleared acres to project features. Conversions of forested land would have long-term adverse impacts to terrestrial wildlife and wetland functional value. However, these impacts would be compensated concurrently with project construction. Acreage involved in compensation would be dedicated in perpetuity. This would contribute to the long-term stability and productivity of wildlife resources and society's environment.

ANY IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES INVOLVED IN THE PROPOSED ACTION SHOULD IT BE IMPLEMENTED

146. Project implementation would irreversibly and irretrievably commit lands and associated resources for the life of the project. It also would commit labor and material, planning and technical expertise, and monetary resources.

PUBLIC INVOLVEMENT

147. A Notice of Intent to prepare a draft EIS was published in the Federal Register on 26 November 1991. A public scoping meeting was held in Jackson on 26 March 1992. In addition to advertising in newspapers of local and statewide circulation, persons and/or agencies and organizations known to have an interest in the project were mailed notices of the meeting. Excluding Corps and cooperating agency personnel, 51 people attended the meeting.

148. The scoping process determined the range and significance of issues. Issues raised during the scoping process included:

a. Group 1.

(1) Status of area flooded in 1979 with new levees in place.

(2) Will discharge of 1979 flood be completely contained inside new levees?

(3) What discharge rate out of the reservoir compares with what the new levee system will handle?

(4) Will project be coordinated with all applicable agencies?

(5) Will project be coordinated with EPA?

(6) Could Ross Barnett be used as an effective flood control facility? What will happen to drainage with new levees?

(7) What will happen to backwater flooding such as Town Creek, etc., with levees?

(8) What will be the impacts to Crystal Lake?

(9) What about hydraulic effects to areas such as Purple Creek?

(10) Does this affect the airport?

(11) Would hydraulic data still be good with Lakeland Drive filling over the years?

(12) Mitigation of significant environmental resources?

(13) Where is material going to come from to construct upper portion of west bank levee?

(14) How long will it be before the levees are constructed?

b. Group 2.

(1) Town Creek area flood control.

(2) Concerned about slow pace of study.

(3) How will hydrology downstream be affected?

(4) Consider opening channel downstream of Jackson to increase flow.

(5) Build levees on both sides of river.

(6) Modify Lakeland Drive bridges to increase flow. Also, highway bridges (Interstate-55 and Interstate-20).

(7) Setback Fairgrounds levees.

(8) Build present levees higher (borrow to come from side of river)?

c. Group 3.

(1) Wetlands, regulation, no net loss.

(2) Recreation, fishing loss.

(3) Long-term value, Eastover Subdivision.

(4) Mayes Lake.

(5) Upstream impact of project people--environment, changes to 100-year flood plain.

(6) Comprehensive land-use plan required Pearl River Basin enforcement--Madison County.

(7) Concurrent funded mitigation.

(8) Outdoor recreation opportunities.

(9) Full National Environmental Policy Act (NEPA) compliance.

(10) Downstream water quality/impacts.

(11) Multipurpose use of improvements.

(12) General impacts to wildlife and fisheries habitat.

(13) Aquifer.

(14) Where is mitigation going to occur?

(15) Impact of recreational use on adjoining property. No recreational use.

(16) No need for additional recreation.

(17) Pollution impacts.

(18) Need to know who is in charge of completed project. Enforcement.

(19) Who is in charge and paying for maintenance of levee and environmental impacts?

(20) Liability for recreational users.

(21) Filling in and building causing more flooding.

(22) Caney Creek needs to be widened; beaver control, Suncrest and Cooper Roads (between) below Highway 80.

(23) Development behind levees change in land use caused by project.

(24) Project effects on existing residence (Caney Creek), streambank stabilization.

(25) Not for project, no guarantee about effects on other people.

(26) Nonpoint source pollution. How to address?

(27) Hazardous waste--will it affect project area? Concerns about past waste disposal in project area.

(28) Will project address rising and falling water from Ross Barnett? Control of river stages, effect on bank stabilization, fishkill as a result?

(29) Will adjoining property owners pay for project through higher taxes or will the tax burden be fairly distributed?

(30) Will project include consideration for bridges and other structures besides land issues?

(31) Pollution effects on sewer systems.

(32) Will river be allowed to flow normally during low flows?

(33) Legality of changing flows.

d. Group 4.

(1) Effect of flood on property tax base (future), property values, and housing costs. Will values increase in project area?

(2) Recreation.

(3) Levees.

(4) Corridor (river).

(5) Circulation/transportation.

(6) Roads (three) trails (bike, jogging).

(7) Walks (four) reservoir access.

(8) Police patrol.

(9) Commercial development.

(10) Marina.

(11) Water-based recreation.

(12) Interpretive.

(13) Archeology/anthropology.

(14) Urban river development.

(15) Tourism.

(16) Cultural resources.

(17) Indian mound near Purple Creek.

(18) Civil War sites.

(19) Commercial (historic) trade routes.

(20) Natural resources.

(21) Visual impact analysis of channel clearing.

(22) Impact on fish and wildlife (channel clearing).

(23) Overall impact on fish and wildlife.

(24) Relationship of the levee design and construction on natural resources.

(25) How wide is levee construction area?

(26) Maintenance of project.

(27) How much money will be required to maintain the levees?

(28) Will the area between the levee and the river channel be cleared? If so, how often?

(29) Will the area be reforested?

(30) Who will be responsible for maintenance of the entire project?

(31) How much will it cost?

(32) Project is a part of two counties and four metropolitan areas and PRBDD, levee board, and CMPDD.

(33) Flood control.

(34) Will it work?

(35) Water level between the inside of levees? Will it be a reservoir? Ponded, etc.

(36) Will other water control structures be needed below Ross Barnett to maintain these levees, if any?

(37) What about deepening Ross Barnett and dredging the river channel above for additional ponding capacity? Evaluate using Ross Barnett for flood control.

(38) Will the project eliminate feeder creek flooding or create more of same?

(39) Evaluate contingency plans for feeder creeks.

(40) Will future development within flood plains be regulated to minimize impact on wildlife and natural resources?

(41) Will continued development make this project inadequate for future flooding (outside levees)?

(42) Will current legislation be changed to allow development of property along the levee?

(43) Will present construction be regulated during the project design stages?

(44) Natural resources.

(45) Wildlife.

(46) How big are levees and how will it impact wildlife in the urban area? Will the game be relocated? Will a permanent conservation area or preserve be a part of this project?

(47) Any endangered species, other than "sawback turtle" in the project area? Sandhill crane?

(48) What impact on breeding habitats?

(49) Will the ponding associated with the project be designed to enhance fish and wildlife habitat?

(50) Will there be any control of the movement of wildlife from one side of the levee to the other?

(51) Wetlands.

(52) How will wetlands be affected by the construction of the levees?

(53) Alternatives for restoring present wetlands.

(54) Purchase of property in unaffected areas.

(55) Restoring them inside the levees.

(56) Timber.

(57) Habitat changes.

(58) Hazardous waste evaluation.

(59) Property.

(60) Taxes,

(61) Values.

(62) Acquisition of lands, how many acres, etc?

(63) Land planning.

(64) Other.

(65) Water supply; how will the project affect the communities' water supplies and quality?

(66) Any sewage or stormwater runoff into the project area.

(67) Sewer.

(68) Storm.

(69) Industrial.

(70) Agricultural.

(71) Will the report be made public?

149. In February 2004, a scoping meeting was held in Jackson. Issues that arose during this meeting are as follows:

a. Comprehensive flood protection plan.

b. Nonstructural alternatives such as reestablishment of the flood plain.

c. Assess future development of area.

d. Contamination of the sediments in the water column of the Pearl River.

e. Development of property.

f. Modeling of possible future flood events.

g. Consider cultural remains.

h. Reinforcing the dam and possibly make a workable sluiceway.

i. Preserve LeFleur Bluff State Park.

j. Loss of bottom-land hardwoods.

k. Endangered species.

l. Downstream flooding.

m. LeFleur Lakes project is that it will destroy approximately 6,000 acres of bottom-land hardwood forests and wetlands that provide biologically diverse habitat for birds and other wildlife along the Pearl River.

n. We should leave LeFleur Lakes just the way God created it.

o. Explain what levee system is going to be installed, how much it is going to cost compared to what Two Lakes will cost. Secondly, I would like to know once Two Lakes, if it is improved, who is going to own Treasure Island in the middle of the lakes.

150. In March 2004, another information meeting was held in Biloxi, Mississippi, and the following issues arose:

a. Long-term productivity of our coastal fisheries.

b. Increase in salinity.

c. Water quality.

d. Tourism industry.

COOPERATING AGENCIES

151. The FWS, MDWFP, EPA, PRBDD, and RHPRFDCD served as cooperating agencies. Cooperating agencies assisted in the development and preparation of the environmental analysis, resource documentation, and the EIS. Contributions included:

a. NEPA and scoping participation.

b. Professional expertise, study direction, and technical analysis.

c. Terrestrial HEP participation.

d. Recreation, cultural resources, environmental design, and HTRW studies.

e. Meeting and field trip participation.

f. Document and technical appendixes review.

152. An alphabetized subject index with references to the EIS is presented in Table EIS-16.

TABLE EIS-16
ENVIRONMENTAL IMPACT STATEMENT

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Executive Order on Flood Plain Management	EIS-7
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Hazardous, Toxic, and Radiological Wastes	EIS-9
Need for and Objectives of Actions	EIS-11
Authority and Direction	EIS-11
Public Concerns	EIS-14
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Components of Comprehensive Levee Plan	EIS-17
Components of LeFleur Lakes Plan	EIS-28
Design and Construction Considerations	EIS-37
Comparative Impacts of Alternatives	EIS-38
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Ground Water	EIS-62,EIS-74
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Esthetic Resources	EIS-63,EIS-75
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